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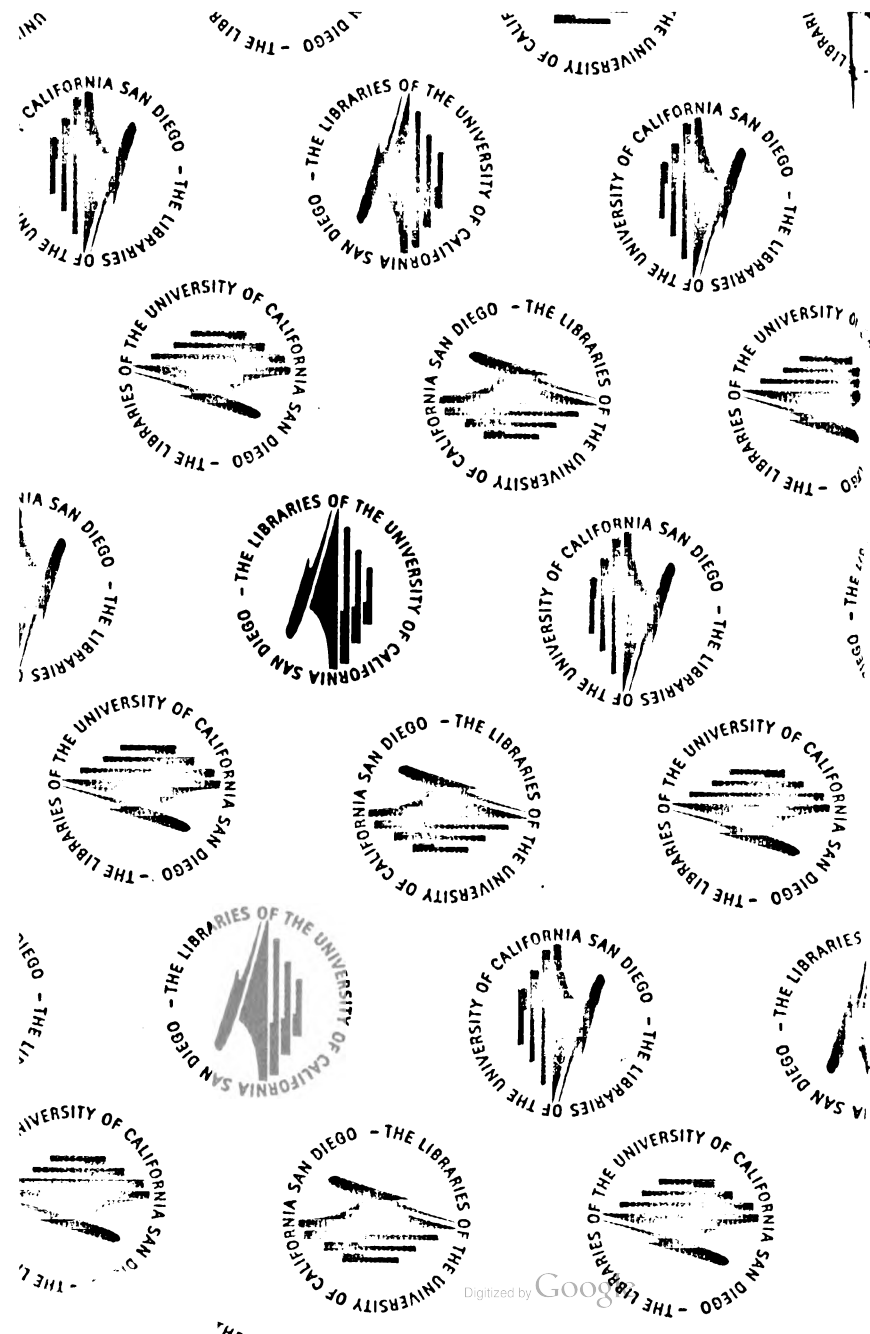
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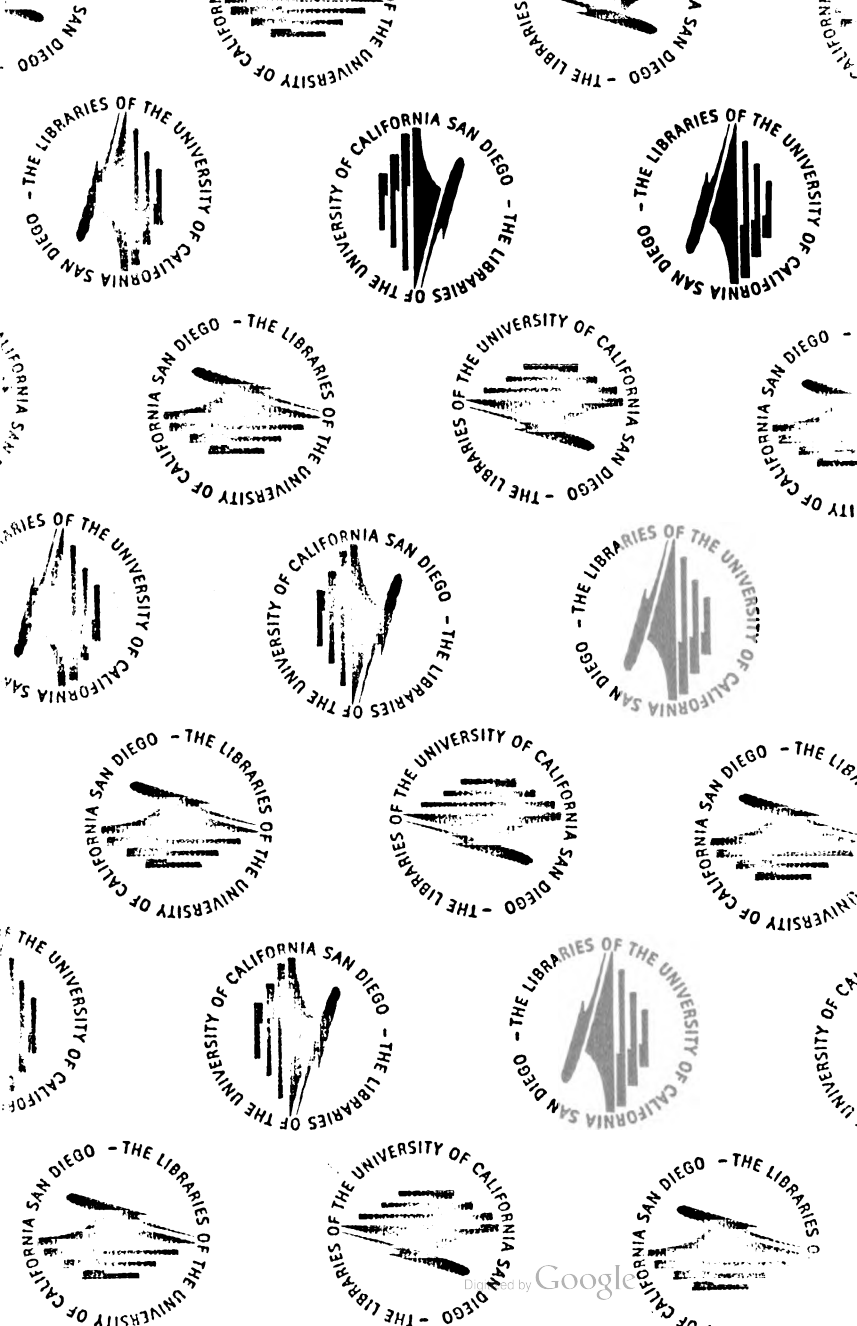


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A HANDBOOK OF NORWAY & SWEDEN

*Compiled by the Geographical Section of the Naval Intelligence
Division, Naval Staff, Admiralty*

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CHAPTER I

GEOGRAPHICAL OUTLINES

Position and extent—Frontiers—Neutral zone—Chief topographical features
—Scandinavian highlands—Eastern slopes—Glaciers—Coasts—Lakes
—Rivers.

POSITION AND EXTENT

NORWAY occupies the western and Sweden the eastern and larger part of the Scandinavian peninsula. The peninsula is cut off from the rest of Europe by the Baltic Sea and the Skagerak and Kattegat, branches of the North Sea, but has a land connexion through Lapland in the north.

Norway extends from lat. $57^{\circ} 57'$ N. to lat. $71^{\circ} 11'$ N., and includes the whole of the northern coast of the peninsula. Sweden extends from lat. $55^{\circ} 20'$ N. to lat. $69^{\circ} 4'$ N. The total area of Norway is 124,642 sq. miles, which is slightly more than the area of the British Isles, and of Sweden 173,035 sq. miles, equal to nearly one and a half times the area of the British Isles. A small part of the Scandinavian peninsula belongs to Finland. The total length of the coast line, disregarding indentations, is about 3,658 miles, of which 2,110 belong to Norway.

Both countries are long and narrow. Norway, which is 1,100 miles long from north to south, has a width varying from 250 to 5 miles. Sweden is 975 miles long, and has a greatest breadth of 310 miles and a least breadth, exclusive of its northern and southern extremities, of 145 miles.

FRONTIERS

The Norwegian-Swedish frontier is 1,027 miles long, the Norwegian-Finnish 458 miles long, the Norwegian-Russian 112 miles long, and the Swedish-Finnish 332 miles long.

These frontiers divide Lapland between Norway, Finland, and Sweden. Denmark approaches to within $2\frac{1}{2}$ miles of Sweden across the waters of the Sound. Bornholm Island in the Baltic, and Saltholm in the Sound, belong to Denmark. Hven in the Sound is Swedish. The Åland Islands in the Baltic belong to Finland.

The frontiers in the Scandinavian peninsula are marked by boundary posts. The Norwegian-Swedish frontier conforms more or less to the line of greatest heights of the peninsula as far south as lat. 64° N., but the two are actually coincident only for short stretches. South of lat. 63° N. the boundary is less natural, and south of about lat. 60° N. it is entirely artificial, the results of many adjustments dependent on the changing fortunes of the two countries. A neutral zone about 10 miles on either side of the frontier was established in 1905 from lat. 61° N. to the sea. Its extent is given below.

The Norwegian-Finnish frontier was settled in 1751. From the frontier cairn at Koltapahta (Kuokimmutatka), where Norway, Sweden, and Finland meet, it follows a winding course along the watershed between the Arctic and Baltic drainage to the sources of the Skjetsamjokka. It then follows that river and the Tanaelv to near Polmak in lat. 70° N. Thence onwards the frontier was long in dispute until adjusted in 1826. It follows a devious course south-east to the Neidenelv which it crosses and continues in a southerly direction till it meets the Pasvikelv at Mutkavaara.

The Norwegian-Russian frontier leaves the Norwegian-Finnish frontier at Mutkavaara, runs south-east to Gelsomiojärvi, and thence follows the Pasvikelv or Paatsjoki almost to its mouth, swinging to the west to leave Boris Gleb, a village on the left bank, in Russian territory. It then turns south-east, rounds Hundvand or Boenajärvi, and runs east to the Jakobselv which it follows to the sea.

The Swedish-Finnish frontier was fixed by the treaty of Fredrikshamn in 1809, and the details decided in 1810. In the north of the Gulf of Bothnia it lies immediately east of

the islands of Sarvenkataja, Stora, Knivskär, Inakari, and Karaja, between Tirro and Sällön, and between Selkakari and Björko to the Torneälf (Torneå). The frontier then follows the Torneälf, the Muonioälf, and the Kängämäälf to the frontier cairn of Koltapahta (Kuokimmutka) where it meets the Norwegian-Finnish frontier. Most of the islands in the Torneälf, including the one near the mouth on which Torneå stands, are in Finland.

The boundaries between Norway and Russia in Lapland were long in dispute and were not demarcated until 1826. During the last year or two there has been much discussion in Norway regarding the readjustment of the international boundaries in Lapland. Opinion is in favour of Finland's ambition to gain an Arctic sea-port, but opposed to her acquiring this at the expense of Norway rather than Russia. It has, however, been suggested that a Finnish Lapland railway might find a terminus on Varangerfjord without the cession of territory by Norway. Such an arrangement would be comparable to that by which the Swedish Lapland railway has its terminus at Narvik. Norwegian claims on Finland centre on the eastern side of the valley of the Tanaelv, a district inhabited solely by Lapps, and Boris Gleb, at present a Russian enclave in Norwegian territory. In 1918 the inhabitants of Boris Gleb are said to have expressed a wish for Norwegian sovereignty.

All these northern frontiers in Scandinavia are in a barren unproductive land, of no importance except to the Lapps, who pay little attention to international boundaries. As affording routes to the interior from seaports, free from ice during winter, the coastal regions of the north have their chief interest.

NEUTRAL ZONE

The neutral zone between Norway and Sweden is defined as follows in the Karlstad convention of 1905—on the Norwegian side in a straight line from Kirkö by the north-

west of Singleö to Ingedal church and thence in a succession of straight lines between the following: Rokke church, a point on the north bank of the mouth of the Fredrikshald river in Femsjön, the mouth of a small stream entering Femsjön near the farm of Röd, the eastern end of Klosatjärn, the eastern end of Grefslivand (north of Härland church), the point standing out into Ögderensjön south-west of Kraaktorp, the strait between Mjermen and Gaasefjord, Eidsdammen, the south-west end of Dyrerudtjärn (at the north end of Liermosen), the church of Urskog, the south end of Holmtjärn, the south angle of Digersjön, the north end of Skasensjön, the east end of North Flögensjön, the point where the Ulvaa cuts the parallel of lat. 61° N.

On the Swedish side the zone is marked by a succession of straight lines connecting the following: the north point of Nordkoster to the south point of Norra Långö, the north-east end of Lake Färingen, the north-east end of Lursjön, the mouth of the Kynne in Södra Bullaren, the south-east end of Södra Kornsjön, the south end of Stora Le, the west end of Ögnesjön, the south end of Lysedstjärn, the south end of Svalsjön, the south end of Nässjön, the south end of Bysjön, the north-west end of Lake Kymmen, the north-west end of Grunnsjön, the north-west end of Kläggen, the north end of Mangen, the south end of Bredsjön, the point where the right bank of the Klarälf cuts the parallel of lat. 61° N.

The irregularity in the south, where the zone is very narrow, was made in order to avoid the inclusion of Skiebergkilen, the bay at the head of Singlefjord, and on the Swedish side to exempt Strömstad.

Islands and reefs which lie within these boundaries are neutralized as well as the mainland, but not arms of the sea.

Only old and obsolete fortifications of no other than historical interest are left in this area. Others were dismantled. It was also agreed that Kongsvinger, which lies outside this zone, should not have its fortifications increased beyond the state they were in at the time of the convention.

CHIEF TOPOGRAPHICAL FEATURES

The chief orographical feature of the Scandinavian peninsula is a lofty broken plateau which lies on the western side of the peninsula mainly within Norway. The Enontekiö district is a wedge of Finland lying within the plateau area. This plateau, sometimes known generally as Kjölen¹ or the Keel, has an average elevation of 2,000 to 3,000 ft. and runs from the south-west of Norway to the North Cape, reappearing at a lower elevation in Spitsbergen. On the west the plateau falls abruptly to the Atlantic, but on the east it passes more or less gradually by gentler gradients into the plains of Sweden which slope down to the Gulf of Bothnia and the Baltic. The Kola peninsula and the whole of Finland and Russian Karelia are a continuation of these slopes at varying but generally low elevations. Sweden, in contrast to Norway, is thus composed mainly of plains which only in the north-west reach the altitudes of the Norwegian mountains. In its south-eastern part Norway embraces part of these slopes, and this is the only extensive area of Norway which is hilly rather than mountainous. The west coast of the Scandinavian plateau is deeply indented by long fjords, several of which afford waterways far into the interior of the country. So extensive are these indentations and their branches and the outlying islands and rocks that there is a sheltered waterway for practically the whole distance from Stavanger to the North Cape, in which vessels are protected from the open ocean.

The east coast of the Scandinavian peninsula, towards the Baltic and Gulf of Bothnia, is low and has comparatively few long inlets of the sea, but on the other hand has many small indentations such as are characteristic of a slightly depressed coast. Only in a few parts, notably opposite the Åland Islands, is there a *skärgård* ('skerry fence'; Norw. Skjaergaard) comparable to the Norwegian one. The coasts of Skåne, in the south of Sweden, are smooth, unindented, and low.

¹ This name is sometimes restricted to the northern part of the plateau north of about lat. 62° N.

The physical features of the Scandinavian peninsula cause Norway to look westward to the Atlantic and the North Sea, and Sweden to turn eastward to the Baltic. Norway's interests have always expanded towards the ocean and lands beyond the ocean from the time of the Viking sea rovers and colonizers to the ubiquitous Norwegian sailors and Norse explorers of the present days. Sweden, on the other hand, has turned eastward in her settlement and conquest of Finland and her domination of the Baltic. Physical circumstances have separated the two countries despite their proximity, and have made them turn their backs on one another. Only in the south do the two peoples habitually meet, and there the two countries have agreed to the establishment of a neutral zone to make what amends they can for the absence of a natural frontier.

THE SCANDINAVIAN HIGHLANDS

The loftier parts of the Scandinavian peninsula consist mainly of a broad belt of early Palaeozoic rocks, folded and overthrust in the west but more or less horizontal in the east. On their extreme west these rocks are flanked along the sea by a belt of Archaean gneiss and schist, while in many places they are broken by masses of eruptive rocks. These granites, gabbros, and syenites form some of the most conspicuous summits on the plateau as well as on certain islands such as some of the Lofotens.

The plateau is a mountainous wilderness deeply cut by long narrow valleys and fjords, but except near the coast these breaks in the plateau are few and widely separated, so that the mountains make a formidable barrier not easily crossed. In the northern part the greatest heights are in Norwegian territory, in the region where Finland, Sweden, and Norway meet. **Jaeggesvarre**, between Lyngen and Ulfs fjords, is 6,283 ft., and **Kistefjeld**, north of Torneträsk, is 5,653 ft. Southward the line of greatest heights lies more or less on the Norwegian-Swedish frontier. **Kebnekaise** (6,965 ft.) and

Kaskasatjåkko (6,866 ft.) are in Sweden. **Sarjektjåkko** (6,971 ft.) and **Pårtefjäll** (6,700 ft.) both lie in Norrbotten in Sweden. **Sulitjälma** (6,158 ft.) lies actually on the boundary line. Between about $66^{\circ} 30'$ N. and 67° N. lat. lies the great icefield known as **Svartisen**, the most extensive in Norway, covering some 230 sq. miles. Its highest point is the summit of Snetind nunatak, 5,246 ft. The **Stora Borgefjeld**, 5,587 ft., at the head of Namdal marks decreasing heights towards the south, until in the Trondhjem district the plateau is at its lowest and is easiest to cross. South of the Trondhjem depression the Norwegian-Swedish frontier passes to the east of the line of greatest heights, and much of the eastward slopes of the plateau are included in Norway. The breadth of the Norwegian highlands consequently increases.

Dovrefjeld and **Rondanefjeld** divide southern and northern Norway, but through the highlands to the east of these mountains Guldal and Österdal form an important cross route between north and south. **Snehaetta** (7,550 ft.) is the summit of Dovrefjeld. Rondane has several summits over 6,000 ft., including **Rundvashögda** (6,890 ft.) These mountain areas are cut off by Gudbrandsdal, a north-west and south-east route, from the greatest heights in Norway which are grouped in a horseshoe formation round the head of Sognefjord. **Jostedalsbrae** and **Jotunfjeld** lie north of Sognefjord. The former is a great snow-field, the summit of which is about 6,795 ft. **Jotunfjeld** is a smaller and more broken snow-field, but contains the highest mountains in Scandinavia, **Glittertind** (8,140 ft.) and **Galdhöpigen** (8,097 ft.), as well as several other summits over 6,000 ft.

At the head of Sognefjord is the **Sognefjeld** in which the chief ice-captured peaks are **Skvettebot Højde** (5,100 ft.), **Fresviksbrae** (5,144 ft.), and **Blaaskavl** (5,817 ft.). No lowland route traverses these mountains, but by an easy ascent of about 3,300 ft. there is access from Sognefjord to Hallingsdal and to Valdres, two deep valleys which both lead to the head of Kristianiafjord.

South of Sognefjord the mountains are lower and the

highlands decrease in width. Heights of 6,000 ft. and over are rare. On the other hand there are few lowland routes, and none north of lat. 60° N. that can be described as easy. The construction of the Bergen railway through this district was a triumph of engineering skill. **Hardanger Vidda** is the most compact mountainous region in the south and reaches 6,063 ft. To the south-east of it lies **Telemarken** district, one of the most favourite tourist resorts in Norway. Southward the highlands rapidly decrease in height and are cut by numerous valleys running south and west and south-east. Saetersdal is a long valley ending in the south coast. It has no lowland connexion with the west coast. There are no perpetual snow-fields south of the Hardanger Vidda and very few south of Sognefjord.

The Scandinavian mountains are covered up to about 2,600 ft. with coniferous forests, among which at lower altitudes are many deciduous trees. Above 2,600 ft. for nearly another 1,000 ft. there are birch forests, but at higher altitudes there is only sparse tundra or no vegetation at all.

Agriculture is naturally confined to the more favoured valleys where soil and climate are suitable.

THE EASTERN SLOPES

To the east and south of the highlands the surface of Scandinavia slopes seaward with a uniformity that is seldom interrupted. This region, which is built mainly of Archaean rocks, with a few exposures of plutonic rocks, is sometimes separated from the highlands by a great scarp, but this feature is neither continuous nor well marked as a rule. It is a region that has been much faulted and folded in the past, and reduced to its present level partly by submergence and partly by long-continued denudation of ice and weather and running water. In the course of this denudation the superincumbent Palaeozoic beds have been almost completely removed. On the west side of Kristianiafjord a small area of Silurian beds remains, saved by subsidence, and the islands

of Öland and Gotland represent fragments of the same formation. Beyond the Baltic the Silurian rocks appear again on the southern side of the Gulf of Finland, and the Archaean rocks in Finland.

The eastern slopes can be naturally divided into four regions. (1) The highland district of northern Sweden which includes practically all Norrland as well as Dalarne and Värmland, the western parts of Svealand. To this region also belongs Finnish Lapland and the Varanger district of Norway. The coast district of northern Sweden should, however, be excluded as belonging rather to the second division. (2) The lowlands of central Sweden, covering the rest of Svealand and the north of Götaland and including the region of the great lakes. (3) The Småland highlands, a detached portion of the highland district lying south of the central lowlands. (4) The plains of Skåne in the extreme south-west, a small district but most divergent from the rest of Sweden.

The Highland District

This comprises more than half of Sweden's total area, but includes all those parts which are of least value for agriculture and settlement, and are the most sparsely populated parts of the country. The bare or tundra-covered mountains of Kjölen generally end abruptly above the birch-clad slopes, and wide deep river valleys cut the slopes into detached upland areas. These river valleys are in striking contrast with the narrow, steeply graded valleys on the Atlantic slope. Numerous high-level lakes occur in this region, generally caused by moraine matter damming back the streams (see pp. 20, 21). The soil on the higher ground is infertile, but in some of the valleys ancient lake bottoms give large areas of sand and loam. Below 1,500 ft. other conditions occur. At these altitudes the river valleys are of course less deeply excavated; the plains are more extensive, and the rivers often slow and winding. From 1,500 to 600 ft. almost all the surface is thickly covered with moraine deposits of varying nature.

Often the surface is stony and covered with rugged boulders, while on the lower ground, where impervious clays occur, swamps and peat bogs are common, but on the drier soil, which is more extensive, the most valuable forests of Sweden are found.

Agriculture is restricted, but in this lower region it is limited by climate alone; for fertile soil is more abundant than on the higher ground.

East of the moraine belt and, roughly speaking; below 600 ft. lies the narrow strip of coastal plain covered with fertile soil derived from deposits laid down on top of the less fertile moraine matter during a period of depression of the land at the close of the Ice Age. In the wide shallow valleys these deposits are especially thick. Between the Öreälff and Indalälff numerous heights of 1,000 to 1,500 ft. occur along the coastal plain. This belt varies from 30 to 100 miles in width, and apart from mining areas forms the only part of northern Sweden that is closely settled. In the central lowlands these conditions of soil spread over the whole width of the country.

The Lowlands of Central Sweden

The coastal belt of Norrland widens south of the Dalälff and spreads across the whole width of Sweden in the latitudes of Lakes Vänern and Vättern. These lowlands extend into Norway to the head of Kristianiafjord. Consequently it was in this part of the frontier lands, where the elevations are low, that a neutral zone was demarcated between the two countries (see p. 9). Altitudes of over 650 ft. are the exception in the central lowlands, and it is possible to cross Sweden from east to west without rising over 300 ft. Fertile soils like those on the coastal belt cover the plains and in the past encouraged the growth of vast deciduous forests. Most of these have now been replaced by agricultural land.

The uniformity of the plains, due to the depression of a large area of the country, is interrupted by small areas of old and elevated rocks as in Västergötland where **Kinneulle**

on Lake Vänern to the north-east of Lidköping rises to 991 ft., **Billigen** near Sköfde to 978 ft., **Mössberg** to the north of Falköping to 1,070 ft. and **Halleberg** to 545 ft., and **Hunneberg** to 486 ft., both to the south-east of Vänersborg. Similar hills farther east are **Omberg** (863 ft.) on the east side of Lake Vättern and the long low range of the **Kolmården** hills (558 ft.) skirting the coast between Norrköping and Nyköping. Exposure to weather has generally stripped these isolated hill-masses of their fertile soil and laid bare the Archaean rocks, rendering them poor forest land and confining agriculture to the more sheltered parts.

In some parts the subsidence which gave rise to these plains has caused large areas to fall still lower and form basins now occupied by lakes. Of these the three largest are Vänern, Vättern, and Mälaren (see pp. 28, 29). The long fjords which lead to Stockholm and Lake Mälaren are of the same origin.

The coast districts south of the central lowlands as far as Varberg on the west and Åhus on the east may be regarded as an extension of the plains in so far as they show not only the same conditions of surface but have also undergone considerable depression giving rise to inlets, scattered islands, and skerries.

A conspicuous feature of the central lowlands of Sweden are the eskars or *åsar* of coarse moraine matter which traverse the country in a north-north-west and south-south-east direction. They often attain considerable length and vary in height up to 100 ft. or even 200 ft. above the general level of the land. Only rarely are they affected by the topography and usually pursue their course over plains and hills. Similar ridges are found in other parts of Sweden and in Norway, but in more hilly districts they play a less important part. Their practical value lies in their excellent water-supply and resources in gravel.

The fertility of the central plains and the ease they offered to penetration, facilitated by the use of the great lakes, attracted the earliest settlers in Sweden and laid the founda-

tion of the Swedish nation. At present they afford the chief route across Sweden both by railway and canal.

The Småland Highlands

The Småland highlands lie in the heart of Götaland and are a detached portion of the highland district of Sweden described above. The differences which occur are due to more southern position and consequently the better climatic conditions, and to the absence of the large rivers which are a feature of the Norrland highlands. The general altitude is over 300 ft., and more than half of the Småland highlands, the central and eastern parts, are over 600 ft. The highest points are **Galtåsen**, 1,188 ft., east of Ulricehamn, and **Tomta-backen**, 1,105 ft., south-west of Nässjö. The fertile soils of the central lowlands are absent, and the forests, as in the northern highlands, are coniferous, but the better climatic conditions have made peat bogs and swamps less numerous and agriculture not unprofitable.

The Plains of Skåne

The southern part of Skåne, south-west of a line from Skåldervik on the Sound to Stenshufvud on the Baltic, forms a region characterized by newer rocks than occur elsewhere in Scandinavia, and comparable with the islands of the Danish archipelago and Bornholm. Rocks of Cretaceous, Jurassic, and Silurian age form the plains of Skåne and lie in strips from north-west to south-east, separated from one another by low ridges seldom 600 ft. in height. These ridges, though many of them have the name of *åsar*, are composed of old rocks brought to the surface by faulting. The most important are **Kullen**, 617 ft., which runs out into the Kattegat north of the Sound, **Söderåsen**, 617 ft., its continuation to the south-east, **Linderödåsen**, 643 ft., which divides the Kristianstad plain from the Österslätt plain, and **Romeleklint**, 606 ft., which runs south-east from Lund and has to the south-west the **Söderslätt** or south plain, the most fertile part of Scandinavia. The plains are in some places quite level and in

others undulating, but their altitude is never over 300 ft. In small depressions lakes are frequent. Recent marine deposits add to their fertility. Beech woods occur in some districts, especially in the undulating country to the south and south-west of Romeleklint.

The islands of Öland and Gotland may be regarded in some respects as detached portions of the plains of Skåne, but in other respects they are more comparable to the central lowlands.

Öland covers an area of 519 sq. miles, and is 74 miles long and 2 to 8½ miles wide. It is separated from the mainland by the Kalmar Sund, which is 1½ miles wide in its narrowest part. The island consists of a level limestone plain overlain with recent deposits, and at a general altitude of 100 ft., but rising to 200 ft. in places near the west coast. There are no mountains, but the colder and drier climate makes Öland not unlike the northern coastal regions in its productions and the activities of its inhabitants.

Gotland lies 45 miles from the Swedish coast, 30 miles from Öland, and 140 from Germany. It is the largest island in the Baltic, being 67 miles long and 27 miles broad with an area of 1,162 sq. miles. Like Öland it is a limestone plateau and is at an elevation of 85 to 140 ft. The soil is the same as on Öland. Pine forests cover a great part of the island.

The northern parts of both Öland and Gotland are sandy wastes.

Gotska Sandö is a small island about 14 sq. miles in area which lies north of Gotland. It has an altitude of 138 ft. Sand hills surround the coasts, but the interior is covered with pine forests. The island is now a national park preserved for its scenery.

GLACIERS

Nearly all the glaciers of Scandinavia occur in Norway, where they cover an area of about 2,000 sq. miles. The Swedish glaciers cover only about 135 sq. miles. Most of the Norwegian glaciers lie in two regions, the first in the south

around Sognefjord and Hardangerfjord, the second about the latitude of the Arctic circle. The first of these areas is the largest extent of glaciers in Europe. **Jostedalsbrae** has an ice cap of 330 sq. miles from which a number of glaciers run to within 150 to 200 ft. of sea-level. **Jotunheim** is also glaciated, but the ice cap is broken by valleys. **Folgefond**, in about lat. 60° N., which lies between Hardangerfjord and its main branch Sörfjord, has an ice cap of 110 sq. miles. With the exception of a few minor ones in the interior of the country this is the most southerly glacier in Scandinavia. In the second and more northern area of glaciers **Svartisen** is the most important. It lies near the sea between Ranenfjord and Saltenfjord, and covers about 230 sq. miles. The other glaciers in the north are small, and they are all near the coast, but only one glacier in Scandinavia reaches the sea, that is the **Engabrae**, a small glacier from **Jökulbrae**, which enters Jökulfjord, a branch of Kvenangfjord in about lat. 70° N. The **Seiland** glacier, covering 46 sq. miles on the island of Seiland, south of Hammerfest, is the most northerly glacier.

Since the Scandinavian glaciers decrease in size with distance from the sea, Sweden has no ice-caps comparable to those of Norway and most of its glaciers are small. They occur in the northern highlands about Kebnekaise, Sarjektjåkko, and Sulitälma. The most southern one is on the slopes of **Helagsfjället** in lat. $62^{\circ} 54'$ N.

The snow-line is low in Norway. In the south it is about 4,500 to 5,000 ft. and in the north it falls to 3,000 or even 2,600 ft. But glaciation recedes from west to east, because it is also dependent on the amount of precipitation, which decreases from the Atlantic eastward. Furthermore the summer temperature increases in the same direction (see Chap. II).

Effects of Glaciation

Although glaciation to-day is unimportant in Scandinavia, the former action of ice is accountable for most of the surface features of the land, including the characteristic contours

of the fjords, the smoothed surfaces of the islands along the coast, the rounded outlines of the mountain summits, the eskars which form conspicuous features in parts of Sweden (see p. 17) and the finely divided soil which occurs in places and gives Scandinavia much of its fertility.

The level terraces and raised beaches, which are conspicuous as areas of level land on some coasts and in some interior districts, are built of glacial débris originally deposited beneath the sea and since emerged by elevation of the land. These terraces are the most desirable land in Norway, and in the north especially have attracted most of the settlers and afforded sites for the villages.

THE COASTS OF NORWAY

The coast-line of Norway is the most peculiar physical feature of the country. Unbroken coast-line exists nowhere along the whole extent from the Swedish to the Russian frontier. The only stretch comparatively free from long fjords is that between Stavanger and Kristianiafjord round the south coast, but only from Stavanger to Flekkefjord can that stretch of coast-line be considered more or less smooth.

The Fjords

The largest fjords, apart from Kristianiafjord, are along the Atlantic from Boknfjord, south of Skudesnes, northward to Trondhjemfjord, and from Vestfjord to Varangerfjord. The fjords are typically steep-sided, their walls often rising sheer from the water's edge to 2,000 or 3,000 ft., and descending almost as steeply below the water-level. They are always narrow in proportion to their length and generally have branches, often at right angles to the main fjord. This cuts the coastal part of the highlands into great blocks almost isolated from one another. Along the coasts smaller blocks have in this manner been cut off from the mainland, forming lofty islands between which and the mainland are deep channels. The **Lofoten Islands** and the **Vesteraalen Islands** are thus cut off from the mainland by the Vestfjord

and its continuations towards the north-east. The Lofoten Islands are granite peaks rising to several thousand feet, separated by deep narrow channels or stretches of low-lying land. In a similar way countless small islands and skerries have been cut off the land, and fringe the whole Atlantic and Arctic coasts of Norway with a skärgård. There are said to be upwards of 150,000 large and small islands off the coast of Norway, the great majority on the Atlantic and Arctic coasts.

The fjords in the extreme north are wider than on the rest of the coast, owing to the prevalence of softer and looser schists, but they are even more branched and interlaced than in the south.

In many cases where branches of adjacent fjords nearly meet, but are separated by a lofty neck of land, overland communication is practical, but seldom used except by tourists, because the intervening neck of land is lofty and the ascent and descent very steep. From the head of most fjords lead the only passable routes through the highlands.

Low-lying ground is rare among the fjords. Some of the smallest islands are low and smooth, rounded by the former action of glaciers but level fertile areas at sea-level are generally confined to small alluvial patches at the mouths of mountain streams. Around Trondhjemsfjord are the most extensive low-lying areas to be seen on the whole Atlantic coast. In some fjords hanging valleys afford a little level ground at high altitudes, and this is often cultivated. The island of Flatö in Radöfjord, between Radö and Holsenö, about 12 miles north-west of Bergen has been chosen as the site of a large aerodrome.

The submarine contours of the fjords are very uniform. The general shape is a trough with a more or less flat floor at a considerable depth, which increases from the head of the fjord towards its mouth, where it decreases somewhat rapidly over the sill which crosses the fjord like a threshold, separating the fjord basin from the deep ocean beyond. In many cases the water inside the sill is considerably deeper than within several hundred miles of the coast. It

follows that anchorage in the fjords is sometimes difficult to procure, as shallow water is near in shore and the bottom slopes steeply, but opposite low-lying land there is generally shoaler water, and as villages and towns have naturally arisen on such sites they always have anchorage near by, generally available for large vessels.

The narrowness and length of the fjords often cause dangerous tidal currents.

Depth of draught is seldom a hindrance to a vessel navigating the fjords, but the narrowness of some of the inner channels forces larger vessels to take an outer course in a voyage along the coast.

Many streams that drain into the fjords fall sheer from considerable heights, and are swollen with heavy rainfall and in summer with melting snows. One result is that a layer of fresh water often lies above the salt water of the fjords, and this facilitates freezing in winter. As a general rule the fjords are open to navigation throughout the year, but some of the inner branches are thus obstructed by ice for short periods during severe winters.

Theories regarding the origin of the fjords vary somewhat; but the probability is that they are due in the main to former glaciers eroding their beds along lines of fault or weakness in the plateau. Considerable depression of the land has since sunk their beds and seaward ends below the sea-level and caused the skerries and landlocked channels.

The fjords are all fully described in the *Norway Pilot*, Parts II and III, but the following among the larger and more important fjords may be mentioned here.

Bokn- or Skudeneshjord, also called Stavangerfjord, is a wide fjord which marks the southern end of the indented west coast.

Hardangerfjord is 70 miles long, with many branches.

Sognefjord, over 100 miles long, is the longest fjord in Norway. It is scarcely anywhere over 2 miles in width and the main channel is 500 to 660 fathoms deep. Some of its northern branches intersect the snow-clad Jostedalstraë.

Nordfjord runs straight inland for about 60 miles and touches the northern side of the Jostedalsbrae. It is 150 to 300 fathoms deep. It is a famous tourist resort.

Storfjord, over 70 miles long, is one of the wildest and most imposing of all.

Romsdalfjord is wide, but has many narrow branches. From the head of the main fjord an important route leads direct to Kristiania along Gudbrandsdal.

Trondhjem Leden, behind Hiteren, leads to the broad winding **Trondhjemfjord**, which is the most important centre of population in northern Norway and the beginning of direct routes east into Sweden and south to Kristiania.

Northward there are many long fjords, but none of great importance till Vestfjord is reached. **Vestfjord** separates the Lofoten Islands from the mainland and leads to the long **Ofotenfjord**, which runs to within 5 miles of Sweden, and on the shores of which is Narvik, the Atlantic terminus of the Lapland railway from Gällivara and Stockholm. Vestfjord has a northern exit, and so forms the usual course for vessels bound to and from the North Cape and Arctic Russia.

Lygenfjord, which is 50 miles long, leads to within 22 miles of the Enontekiö region of Finland. The chief route is by Skibottendal on the east side of the fjord about 38 miles from its head.

Wide fjords are numerous in Finmark, and there are sheltered channels all along the coast. East of **Laxefjord**, in long. 27° E., the skjaergaard ends, but the long fjords continue and the coast remains lofty; **Tanafjord** and the Tanaelv lead into Finnish territory.

Varangerfjord opens to the east and is surrounded by Norwegian territory, but several branch fjords and their head valleys give access to Finnish Lapland or to Russia.

The South Coast

The south coast of Norway, from Stavanger and Boknfjord eastward is much less broken than the west coast; but few parts of it are free from small fjords and scattered islands,

and though its altitude is lower it is everywhere bold and lofty, except along the Jaederen coast immediately south of Stavanger. Many of the inlets afford excellent harbours, and small seaports are numerous. Since the plateau slopes down to the south, routes to the interior are easier and more numerous than on the west coast, but of less importance, because the direct routes to Kristiania are naturally by sea.

Off this coast lies the Norway channel, a submerged fjord-like channel, extending from Kristianiafjord to the Atlantic, cutting off the shallow North Sea and Kattegat from the coastal waters of the south of Norway. The depths in the Norway channel are as much as 400 fathoms in places.

Kristianiafjord is the most important in Norway, and differs in several respects from other fjords. It is comparatively shallow, wide in some parts, contains several islands, and is surrounded by the most extensive low ground in Norway. The entrance to the fjord is generally taken to be between Faerder, to the west, and Torbjörnskaer to the east, in about lat. 59° N. but the name is sometimes extended farther south. During January and February there is generally a good deal of ice in Kristianiafjord, but channels are kept open by ice-breakers. For details see Chapter II.

THE COASTS OF SWEDEN

The coasts of Sweden present three different aspects. From the Norwegian frontier along the Skagerak as far south as Varberg they are much indented by fjords and fringed with islands; but the resemblance is rather to the south coast of Norway than to the west coast, for the fjords are seldom long and the islands are not very numerous. The longest fjord is Gullmarfjord, 17½ miles long. The land is low, for here the central Swedish lowlands face the west coast, and there are not enough ramifying channels to afford a landlocked passage along the coast. In many parts the coast, although low, is barren and of little economic value. But in other parts, where the forests have not been destroyed, better conditions prevail.

South of Varberg and round the coast of Götaland to Åhus another type of coast-line prevails. Wide bays replace the fjords and islands are absent. The plains of Skåne meet the Baltic at a gentle gradient which, continued below the sea, causes shallow water along the shore. The east and south and to a less extent the west coasts of Skåne are fringed with sand dunes.

From Åhus to Karlskrona the southward facing coast is much indented and there are many small islands, but farther north along the Baltic (including Öland) the southern type of coast again prevails.

Lastly, from Öland northward extends the third type, a much dissected coast-line with many long inlets and a profusion of islands which are especially numerous off the fjords leading to Lake Mälaren, where they form the Stockholm and Söderarm skärgårds. The inlets are drowned river valleys, and do not run far into the interior. The islands are small, often mere rocks, and are all low-lying. The shore itself is seldom rocky and generally low and wooded. The coastal waters are shallow.

LAKES OF NORWAY

Lakes in Norway cover 2,934 sq. miles or about $2\frac{1}{2}$ per cent. of the area of the country. The most remarkable lakes are the long narrow ones lying in the valleys, often at a considerable elevation and of a great depth. In these cases, where they lie in chains, they afford valuable routes in the mountainous country. The low-lying lakes near the sea are of the same origin as the fjords, and each is separated from the sea by a low neck of land which, after further submergence, would make the sill which is typical of a fjord. As in the case of the fjords, the lakes are often deeper than the sea beyond. The largest lake in Norway is **Mjøsen**, 140 sq. miles in area. But the most remarkable lake is **Hornindalsvand**, 6 miles beyond the head of Nordfjord. The depth is 1,594 ft or 1,414 ft. below the sea-level. All the long valley lakes of Norway are of value as lines of communication through the

country. Lake **Stora Le** lies partly in Norway and partly in Sweden, and serves as a link in water-borne traffic between the two countries. But perhaps the most important function of the Norwegian lakes is their action as reservoirs for the surplus water derived from the spring melting of the snows. In a country like Norway, where winter snowfall is considerable, disastrous floods would occur every spring were it not for the lake basins, which hold back the water and let it pass into the lower river reaches comparatively slowly, though quickly enough to facilitate the carriage of timber to the coast (see pp. 148 *seq.*).

The lakes close to the coast in the south-west freeze only in severe winters, but those in the north and in the interior freeze for a longer or shorter period every year.

The chief lakes in Norway are given in the following table. Others are mentioned in the section of this book on the rivers, where the relation of some of the lakes to the rivers is also considered.

	<i>Altitude in ft.</i>	<i>Area in sq. miles.</i>	<i>Greatest depth in ft.</i>
Mjösen	397	140	1,482
Faemundsjön	2,175	79	427
Rosvand	1,227	73	820
Randsfjord	446	52	355
Tyrifjord	207	51	920
Snaasenvand	78	49	443
Tansjön	1,264	36	—
Öieren	332	36	—
Limingen	1,382	36	—
Altevand	1,664	33	—
Nisservand	804	28	—
Bandaksvand	236	24	725
Selbusjön	525	23	443
Nordsjön	48	23	540
Fyrisvand	984	21	—
Hornindalsvand	180	20	1,594
Tinsjön	605	17½	1,436
Bydinsjön	3,485	17½	705
Kröderen	433	16	100
Tyinsjön	3,536	13½	325

LAKES OF SWEDEN

Lakes are more numerous in Sweden than in any other European country except Finland. They cover over 14,500 sq. miles, which is about 8 per cent. of the country. Most of the lakes in the north are elongated, and occupy basins in the river valleys at altitudes of over 400 ft. Their direction is NW. and SE., and in many cases, as in Finland, they merge imperceptibly into the rivers and it is impossible to say where the lake ends and the river begins. The largest of these northern lakes are **Siljan**, in Dalarne, with an area of 110 sq. miles and an altitude of 530 ft., **Storsjön** in Jämtland covering 172 sq. miles, and at an altitude of 958 ft., **Hornafvan-Storafvan**, 273 sq. miles, alt. 1,378 ft., **Luleträsk** on the Luleälf, 88 sq. miles, alt. 1,214 ft., and **Torneträsk**, 125 sq. miles, alt. 1,132 ft.; the last three are in Lapland. The northern lakes have little economic importance.

In the central lowlands lie the largest lakes, in wide irregular basins. The four most important are **Vänern**, **Vättern**, **Mälaren**, and **Hjälmaren**.

	<i>Altitude in ft.</i>	<i>Area in sq. miles.</i>	<i>Length in miles.</i>	<i>Greatest depths in ft.</i>
Vänern	144	2,141	93	292
Vättern	289	733	81	390
Mälaren	1	444	73	210
Hjälmaren	69	185	38	59

These lakes and several smaller ones have great economic importance to Sweden in facilitating intercourse within the country and between the east and west coasts. Their outlet streams have in several cases been canalized.

In the region of the great lakes there are many small ones, but few of great value. Although they are navigable their use as lines of communication is small, for railways are numerous. In fact many of these lakes are now a hindrance rather than a help to movements and trade. In the Småland highlands there are many lakes, but farther south in the plains there are few.

The great lakes of the centre of Sweden freeze in November or December, but might be kept open for a few weeks with ice-breakers. The lakes in Norrland freeze in October. The break-up of the ice occurs in April in southern and central Sweden, and as late as May or June in Norrland.

RIVERS OF NORWAY

The rivers of Norway are numerous, but as a rule short and turbulent. They often expand into long narrow lakes and frequently form waterfalls, which add to their picturesqueness but not their utility, except in the provision of water-power. They are always swollen in spring or early summer, but the lakes generally prevent serious flooding. There is a second rise in autumn, due to heavy rains. In winter the rivers are low because many of the source-streams are frozen.

The principal river in Norway is the **Glommen**, which rises in the highlands, south of Trondhjemsfjord, at a height of 2,290 ft., and has a course of about 400 miles before entering Kristianiafjord. It flows through several lakes including Öieren. At Kongsvinger the river makes a sharp bend where in post-glacial times it changed its course from south to west. In times of flood some of the Glommen water still follows its old bed, and reaches Lake Vänern in Sweden. On its lower course it has at least seven falls, of which Sarpsfos, 60 ft. high and 164 ft. wide, is the greatest. Sarpsfos is 8 miles from the mouth of the river. The current of the Glommen is swift at all times and particularly so in the spring floods. While the river has importance for timber-floating, its chief value is in its upper valley, which forms part of the direct route between Trondhjem and Kristiania.

The river **Laagen** flows south-east from its sources near Romsdalsfjord, through Lake Mjösen and other small lakes, to join the Glommen. It is about 200 miles long. In its upper course its valley forms a route through the high country north-east of Sognefjord. This part of the river is better known as **Gudbrandsdal**, following a usual practice in Norway to transfer the name of the valley to the river and also to the

surrounding country. Below Mjösen the river is known as the **Vormen** as far as its confluence with the Glommen. Vormen means 'the warm' in old Norse, but the Vormen is generally frozen before Mjösen, although it often breaks up a few days earlier.

The **Tistedalelv** lies in the south-east of the country south of the Glommen and drains through a series of long lakes to the eastern side of Kristianiafjord. The chief lakes are Örje, Ödemark, Aremark, and Aspern, at elevations of from 384 to 340 ft. Short stretches of the river between the lakes are full of rapids.

The **Dramselv** is a large river entering Kristianiafjord on the west side, which unites many streams from Hemsdalsfjeld, Valdres, and Filefjeld. The chief sources are **Randselv** from the long Randsfjord and the **Baegna** or **Aadalselv**, which flows from Valdres through many lakes, including Spirillen (alt. 495 ft., depth 354 ft.), and over the high Hönefos fall. These two streams unite to form the **Storelv**, which expands in Tyrifjord. Below Tyrifjord the Dramselv begins and is joined on the right by **Hallingsdalelv**, which flows from Hemsdalsfjeld through Lake Kröderen. Below Lake Kröderen it is often called the **Snarumelv**. The valleys of all these rivers afford routes of importance, but none of the routes is easy or at a low elevation. The rivers in this system are not navigated, unless locally, but the lakes are useful steamer routes.

The **Numedalslaagen** rises in Hardanger Vidda and flows into Kristianiafjord near its mouth, after a course of 190 miles. It flows through few lakes on its upper and none on its lower course. Consequently it is very irregular in flow. The Laagen has several notable falls, including Hammerfos, Labrofos, 131 ft. high and Vittingfos, 62 ft. It is one of the best salmon rivers in Norway.

The **Skienelv** drains Telemarken district. Its total length is 150 miles. Important lakes on its course are Tinsjön Hitterdalsvand, and Nordsjön. On the **Maane**, a tributary which flows into Tinsjön, is the fall of Rjukanfos, 415 ft. high. Near the mouth of the Skienelv there are also falls.

The lakes are serviceable routes, but they lead to no through routes of importance, with the notable exception of the **Eidelv** which flows into Nordsjön from the west over Ulefos, 36 ft. high. This river, under various names, drains from the south of the Hardanger Vidda through Grungevand, Vinjevand, Bandaksvand, alt. 236 ft., Kviteseidvand and Flaavand, alt. 230 ft. Below Vinge vand the **Tokeelv** joins from Totakvand, falling over the high Hyllandsfos, 288 ft. Rapids and falls interrupt most of the rivers, but the lakes and valleys linked together form the chief route across southern Norway. This is known as the Vesttelemarken water system.

The **Nidelv** comes from Vraavand, alt. 844 ft., and Nisservand, lying south of Bandaksvand and Kviteseidvand, and is 125 miles long. Further south and round to Boknfjord the rivers are smaller and of less importance; they are more gently graded and flow through fewer lakes, but in virtue of their position none of them leads to important routes. The **Otteraa** which flows through the picturesque Saetersdal is the most important and is 150 miles long.

The west coast rivers are shorter and more rapid than those on the east and are famed for their beauty. Their only economic value, apart from attracting tourists, is in salmon fishing, but they could in many cases be utilized for water power. Several streams noted for their waterfalls flow into Hardangerfjord. The chief fall is Vöringfos, 535 ft., on the **Bjoreia**, which enters Eidsfjord, a branch of Hardangerfjord. Besides the fall there is a series of turbulent cataracts. In Sorfjord, another branch, are Lotefos and Espelandsfos. Less accessible is Skjaeggedalsfos, 525 ft., several miles up the **Tyssaa**. Around Sognefjord some of the short rivers have great falls. The **Morkedöla** falls 850 ft. in Vettisfos, at the head of Aardalsfjord.

In Geirangerfjord, a branch of Storfjord, are the famous falls known as the Seven Sisters.

The **Namsenelv**, flowing into Namsenfjord, a branch of Foldenfjord, has several notable falls, including Fiskumfos,

105 ft. high. The Namsenelv has a great reputation as a salmon river. Its length is about 118 miles, and that of its main tributary the **Sanddöla** 60 miles.

The rivers draining north to the Arctic Ocean have gentle gradients and a few rapids but no waterfalls. The **Altenelv** or **Storelv** rises in the frontier lands north of Enontekiö at an altitude of about 1,400 ft. Its length is about 112 miles.

Its upper course, called the **Kautokeinoelv**, is more or less a series of long narrow lakes linked by short stretches of river, most of which are studded with rapids. Half-way from the sources to the sea is the waterfall of Nieiddagordsje. In most places the river flows in a deep valley, but it is still imperfectly known in parts. Below Savtso falls the Altenelv can be navigated by boats, but there are many small rapids. Shoals are frequent throughout. The width varies from 100 to 1,000 yds., but the latter is exceptional. Floods occur towards the end of May, when the river rises 10 ft. above its lowest summer-level. The Altenelv valley is unlikely to afford a route of any importance.

The **Tanaelv** or **Tenojoki** is the third river in Norway in point of length and the greatest in the north of the country. It is formed by the union of the **Karasjoki** and the **Anarjokka** or **Inarejoki**. The Karasjoki and the Anarjokka rise in the high lake region north of Enontekiö and the Tanaelv flows into Varangerfjord. The Tanaelv itself forms the Norwegian-Finnish frontier for 84 miles from near Polmak to the confluence of the two-source streams. The Anarjokka forms the frontier for 45 miles, and its tributary the **Skjetsamjokka** for 27 miles. The lowest reach of the Tanaelv for 36 miles flows through Norwegian territory.

More than two-thirds of the basin of the Tanaelv system are in Norway and less than one-third in Finland. The chief Finnish tributaries are the Puolmakjoki and the Utsjoki. There are a number of islands in the Tanaelv of which some belong to Norway and others to Finland. Sparresuolo, 7 miles above the confluence of the Levojokka, is Norwegian, though shown as Finnish on maps of Finland. Higher up

are five Finnish islands, of which the largest is Dalvadassno. The islands at the mouth of the Valjokka are Norwegian and those a little higher up are Finnish.

The Tanaelv itself is 120 miles long and has a low gradient. The fall of some 700 ft. is mainly concentrated in small rapids. The only formidable rapid is Storfos, about 45 miles from the mouth, which has a fall of 23 ft. in about 1,000 yds. Shoals and sandbanks abound and are continually changing, for, in the absence of lake basins to regulate the flow, floods are frequent, and the river rises 20 to 30 ft. in early summer. Dams of ice add to the danger of the floods. The width of the Tanaelv varies with place and season from about 2,000 yds. at the mouth to about 200 yds. or less near Storfos at low water, and 800 yds. at high water. Higher up it again widens. The tide ascends 6 or 7 miles, and enables small vessels to enter the mouth. The banks are low and wooded. The Anarjokka and the Karasjoki are much more impeded with rapids than the Tanaelv, and they have many banks and shoals. They are also narrower and swifter.

River boats ascend the Tanaelv to the confluence of its head-streams, the Anarjokka for a few miles more, and the Karasjoki up to the confluence of the Bavyajoki.

The Neidenelv, or Näätamöjoki, is a large river which flows into Kjölfjord, a branch of Varangerfjord. It rises in Iijärvi in Finland at a height of 650 ft., and has a course of 50 miles in Finland and 13 in Norway. From the mouth, shoals are numerous for 6 miles up to the fall of Kobbefos. Two and a half miles higher up is Skoltefos, 52 ft. high. Above this fall the river is moderately placid as far as the frontier, but in its Finnish reaches small waterfalls and rapids are numerous. The tide is felt as far as Skoltefos. The width of the river throughout its course averages about 54 yds. and its depth varies, but is nowhere great. Boats can descend from the frontier but have to be carried round the falls. Up to Skoltefos the Neidenelv is a good salmon-river. The valley of the Neidenelv forms the easiest lowland route from Finnish Lapland to Varangerfjord.

The **Munkelv** or **Uutuanjoki** drains from Lake Inari in Finland to Kjölfjord. It is 21 miles long and less than half its length is in Norway. The river is shallow and has a small fall near the frontier. Small boats can navigate its entire length.

The **Pasvikelv** or **Paatsjoki**, which is one of the frontier rivers of Norway, is a considerable stream from Lake Inari in Finland. Its total length is 80 miles from Inari to Bökfjord. For 66 miles it forms the frontier between Norway and Russia. Near its mouth it flows for 3 miles between Russian territory on both banks, but its estuary is entirely in Norway. Of its upper course about 5 miles are in Russian territory and the rest in Finland. The Pasvikelv consists of a series of large and small lakes linked together by short turbulent stretches of river. Waterfalls are numerous. The lowest is Skoltefos, 20 ft. high in the Russian territory near the mouth. About 3 miles farther up is Havefos. In this lower part of the river the valley is deep with mountainous ground on both sides. Holmfos is about 6 miles farther up after several lakes. Klostervand, or Tsjoalmejärvi, is one of the largest lakes in the river, and from it a lowland route reaches Langfjord in the north which opens into Bökfjord north of the mouth of the Pasvikelv. Of the islands in Klostervand, Little Skagö is Norwegian and Great Skagö is Russian. The next large rapid is the long Melkefos, round which a corduroy road has been built. Above Blaesvand rapids are more numerous. The large island which lies in Vaggetemjärvi is Russian territory. The whole river can be navigated by shallow Lapp boats under Lapp guidance. The boats are poled upstream through the smaller rapids and shoot them coming down, but portage is necessary round the larger falls.

The **Jakobselv** or **Voriema** is a small river which forms the north-eastern end of the Norwegian-Russian boundary. It flows in a deep valley but its shores are easily accessible. In its lower course it is slow and winding, but its upper reaches are swift and deep. It is unnavigable above its mouth.

RIVERS OF SWEDEN

The rivers of Sweden are numerous and, unlike those of Norway, they are often long and flow in relatively wide and shallow valleys. Waterfalls are not common, but rapids are frequent. All the great rivers are either in the northern highland district and discharge to the Gulf of Bothnia or drain from the great lakes in the central lowlands. The northern rivers run south-east through forest-clad wastes from the heights of the plateau, and are roughly parallel to one another, generally passing through lakes in their upper reaches. In their lower course they cut deep and laterally into the soft soil, forming curious cliffs known as *nipor*. As a rule they enter the sea through long estuaries. In the higher ground they have cut deep but open valleys; nearer to the sea their valleys are less deep and the rivers are broader. The number of these wide rivers is a great hindrance to easy communication between north and south. The largest are the **Kalixälf**, the **Luleälf**, the **Torneälf**, the **Umeälf**, the **Ångermanälf** and the **Dalälf**. The **Torneälf**, or Tornionjoki, with its tributaries the Muonioälf or Muonionjoki and the Kõngämäälf, are described in the *Handbook of Finland*. The **Kalixälf**, which is 266 miles long, has numerous rapids even on its lowest reach. The **Luleälf** is 193 miles long by its main stream. It has a series of cataracts one mile long, with a total fall of 72 ft. at Edefors about 60 miles from its mouth, and another notable fall at Harsprång a few miles below its exit from the long Luleträsk. Harsprång has a fall of 250 ft., of which 100 ft. are in a sheer drop. At the head of Luleträsk is Stora Sjöfall, 130 ft. high. The **Angermanälf** is second only to the Torneälf in length and volume of water. It is 279 miles long and drains through several lakes and has many rapids. The **Dalälf**, 320 miles long, is almost as big as the Ångermanälf. It flows through Lake Siljan and many smaller lakes.

All these northern rivers are liable to flooding so serious that occasionally they change their courses. The Dalälf and the Indalsälf have done so within the last two and a half centuries.

The **Klarälf**, which has its upper course in Norway, where it is called the **Faemund**, flows into Lake Vänern after a course of 228 miles.

The three important rivers draining the great lakes are the Götaälf, the Motalaström, and the Norström, with its parallel branch the Södraström.

The **Götaälf** runs from Lake Vänern to the Kattegat, and is 436 miles long. Most of the rapids on it are small, with the exception of the great Trollhättan falls. The river there runs through a narrow channel across granite, and falls 108 ft. in less than a mile, causing falls which, if not the greatest in Sweden, are certainly the most famous. The lower course of the Götaälf is comparatively quiet, and it enters the sea through a long estuary.

The **Motalaström** is a rapid river which drains Lake Vättern to the Baltic. It flows through Lakes Boren, Roxen, and Glan. The **Norström** and the Södraström are the short streams by which Lake Mälaren empties to the Baltic. The Stockholm harbour works and the growth of the town have blocked Norström, and Södraström is regulated by a lock.

The rivers of the south are all small and of little importance.

The seasonal variations in the volume of Swedish rivers are large. High water occurs in spring, during the melting of the snow, but owing to the great extent of latitude the country covers, the spring flood varies in time of arrival. In the centre and south it reaches its height in April or May, but in the north not till June or even July. In the northern and central rivers the spring rise is far more marked than in the southern ones. There is a second rise in autumn, related to diminished evaporation and increased rainfall. Low water occurs in August and September and again in late February, March, or early April.

All Swedish rivers freeze in winter: in the north from October to May or June, in the south from December to April.

CHAPTER II

CLIMATE

General characteristics—Temperature—Pressure and winds—Precipitation
—Forests and climate—Sea ice—Opening and closing of ports.

GENERAL CHARACTERISTICS

SCANDINAVIA has a climate more or less intermediate between those of western and eastern Europe, but the contrasts between west and east of the peninsula, or broadly speaking between Norway and Sweden, are great because the oceanic influences which have free play in Norway are cut off from Sweden to a large extent by the heights of the plateau. Sweden, on the other hand, is freely open to the plains of eastern and central Europe, and the Baltic has a slight influence in increasing temperatures on its coasts. It is, however, the oceanic influences which give the Scandinavian climate its chief characteristics. The warm Atlantic drift which, unimpeded, reaches the shores of Norway has a temperature in winter several degrees above 32° F. This in conjunction with the prevailing strong westerly winds gives Scandinavia a mildness quite inconsistent with its latitude, and since the effects are felt to the north of Norway and farther to the east no part of Norwegian seas are frozen in the winter and the ports are always open. Furthermore, the open sea permits fishing all the year round, and the relatively open climate allows agriculture even in the extreme north of the country. The mountains of the interior, however, form a barrier to these influences, which steadily diminish towards the east. The interior of Lapland and north Sweden escape the polar climate of eastern Canada, in the same latitude, but have a far more rigorous winter than northern Norway.

The oceanic influences also make themselves felt in precipitation, again, in a greater degree in coastal Norway, where

precipitation is heavy, than in central Norway and Sweden where it is much lighter.

The great length of the Scandinavian peninsula, 1,000 miles or more, also results in climatic contrasts between south and north, and these are accentuated by the high latitudes in which it lies. The summer days are long and the winter days correspondingly short. At the North Cape the sun is above the horizon from May 12 to July 29. At Bodö, in lat. $67^{\circ} 17'$ N., long. $14^{\circ} 24'$ E., it is above the horizon from June 3 to July 7. At Haparanda, at the north of the Gulf of Bothnia, the longest day is 23 hours between sunrise and sunset, and at Stockholm $18\frac{1}{2}$ hours. Long twilight, however, adds to the length of the day. During June and July the whole of Scandinavia except the extreme south enjoys uninterrupted daylight. The length of the summer days has a beneficial influence on animal and vegetable life which to a large extent counterbalances the shortness of the summer. The low angle of the sun's rays gives a southward-facing slope great advantages.

The contrasts between winter and summer are well marked, especially in Sweden and the interior of Norway. On the oceanic border of Norway the differences are less great. The intermediate seasons of spring and autumn decrease in length from south to north. In the far north they hardly exist, and winter and summer pass abruptly into one another. Summer begins in the north early in June and ends in September. In the south of Sweden the four seasons have much the same period as in the British Isles.

The climate of western Norway, in general terms, is cool, equable, stormy, and wet, with a considerable amount of cloud. It is not unlike the climate of Scotland. Sweden has a different climate, warm in the short summer, cold in winter, dry and with little cloud. It approximates to the climate of Finland.

TEMPERATURE

Most marked contrasts in temperature occur between the coast regions of Norway and the rest of the peninsula. February which is generally the coldest month, has a mean of about

36° F. on the south coast of Norway, about 32° in the outer Lofotens, about 26° at the North Cape, and about 10·5° at Sydvaranger. Absolute minima are low, but seldom reach 0° on the coast south of Tromsö. At Skudenes the lowest temperature recorded is 5·6°, at Tromsö 0°, and at Sydvaranger -40·3°. The number of days on which frost occurs varies from 60 at Skudenes to 188 at the North Cape and 222 at Sydvaranger. Temperatures remain low in March and April. There is no marked rise before the end of May in the south and June in the north. Summer temperatures are seldom high and range between 52° and 60°. The warmest month is generally August, but July and the first half of September are little cooler. At Skudenes the August mean is 57·9°, at Tromsö the July mean is 51·8°, and at Sydvaranger the July mean is 52·7°. Absolute maxima are high: 84° has been recorded at Skudenes, 86·3° at Bergen, 76° at Tromsö, and 87·4° at Sydvaranger. In October the temperature falls rapidly. At the head of the fjords the summer and winter extremes are greater, the climate approaching that of the interior of Norway and Sweden. Trondhjem, 30 to 35 miles from the ocean, has a February mean of 26·8° and a July mean of 57·2°. With altitude and distance from the coast the temperatures steadily decrease, but even at considerable elevation there are occasional high summer temperatures.

In the interior of Norway and the whole of Sweden the annual range of temperature is much greater both by decrease in winter and increase in summer. February is the coldest month and has a mean temperature of under 32° over Sweden and south-eastern Norway. Kristiania has a February mean of 23·9° and Stockholm 25·7°. But the coldest regions are the Glommen valley in Norway between Tönset and Röros, with the adjoining part of Härjedalen in Sweden, and the heart of Swedish Lapland. At Röros the mean of the coldest month, February, is 12·2°, and at Karesuando in Lapland 5·2°. Absolute minima are very low. At Röros (altitude 2,067 ft.) -47·7° has been recorded, and at Karesuando (altitude

1,082 ft.) – 40°. At Vuonatjviken a temperature of – 67° was recorded in 1917, but this was quite exceptional.

In some parts of Lapland frost occurs in every month of the year. At Karesuando only five months have a mean temperature above freezing point.

Sweden and south-eastern Norway have high summer temperatures, several degrees above those of the coastal regions of Norway. July is generally the warmest month, but June and August are little cooler except in Lapland. Kristiania has a July mean of 60·6°, Göteborg 62·2°, Stockholm 62°, Haparanda 59°, and Karesuando 54·2°. In the short warm summer temperature occasionally rises high. At Kristiania an absolute maximum of 93° has been recorded and at Karasjok in Lapland 88°. In October the fall of temperature is rapid and in November winter sets in.

MEAN MONTHLY TEMPERATURES OF COLDEST AND WARMEST MONTHS

	<i>Station Altitude.</i>	<i>Coldest month.</i>	<i>Warmest month.</i>
	<i>ft.</i>	<i>February</i>	<i>August</i>
		<i>° F.</i>	<i>° F.</i>
Skudenes	16	34·5	57·9
Bergen	66	33·6	57·9
			July
Trondhjem	33	26·8	57·2
Tromsø	49	25·0	51·8
Sydvaranger	66	10·4	52·7
Kristiania	82	23·9	60·6
Röros	2,067	12·2	52·2
Göteborg	33	30·4	62·2
Jönköping	312	28·0	61·1
Visby	49	30·2	61·1
Stockholm	148	25·7	62·0
Härnösand	344	20·0	59·2
Haparanda	33	10·6	59·0
Karesuando	1,082	5·2	54·2

PRESSURE AND WINDS

The prevailing westerly winds in Scandinavia are to some extent interfered with by the distribution of pressure over the peninsula. In general terms the pressure is high in winter and low in summer. The high winter pressure causes

outflowing winds which as a rule are light in the interior of Norway and over the whole of Sweden; but on the west coast of Norway, where the pressure gradient is steep, they blow with considerable strength generally from the south and south-east, and in Finmark from the south-west.

In summer the normal westerlies resume their sway and are generally light, but along the west coast of Norway may blow with some strength. Along the coast the wind generally follows the direction of the fjords, blowing straight up them. In Sweden and the Gulf of Bothnia the summer winds are light and variable but frequently from the south-west.

Gales are frequent on the west coast where three to four occur on an average every month in winter and less than half that number in summer. In the interior and east of the peninsula gales are comparatively rare. Gales from the south-west are most common; next in frequency are those from the west and north-west. These gales are of a cyclonic nature and blow with great violence. Those from the south-west bring heavy rain and those from the north-west snow. They frequently last for several days.

Calm weather is rare on the west coast but frequent in the interior and east coast in winter. The west coast has much calm weather in summer.

Fogs are frequent on all coasts in summer but rare in winter. Sometimes a phenomenon known as 'smoke frost' appears on the west coast fjords in severe winter weather. It is due to the relatively high temperature of the sea compared with that of the air.

Thunderstorms are not frequent in Norway or Sweden and are rare on the coasts. They usually occur in summer but westerly gales in winter are sometimes accompanied by thunder and lightning.

PRECIPITATION

Precipitation in Scandinavia on the whole decreases from west to east but the greatest amount falls on the western edge of the plateau, generally a few miles from the coast.

In the mountains north and south of the entrance to Sognefjord the annual amount exceeds 100 in. and even rises to 120 in. in places. At sea-level the coast of Norway has 40 to 60 in. of precipitation a year. Eastward of the western edge of the plateau the amount rapidly diminishes and averages 30 to 40 in. over the interior of Norway and all the western part of Svealand. Eastern Sweden in the south and centre has an average of 20 in., decreasing to 18 in. or less along the Gulf of Bothnia, and an average of 18 in. in Norrland. In the north of Lapland the average is under 18 in. Along the east coast a prolonged summer drought is not uncommon.

August in Sweden and August and September in Norway are the months of heaviest rain. In Norway, however, there is a good deal of precipitation in winter. The driest period in Scandinavia is April and May but there is no dry season. Precipitation occurs in all months of the year.

Much of the precipitation falls as snow, especially in the highlands and in Sweden. On the coast of Norway the average number of days when snow falls varies from 30 to 40 in the south to 100 at the Lofotens, in the north, and in the interior. In Lapland about 36 per cent. of the precipitation falls as snow, in Skåne about 9 per cent. In the north of Sweden snow lies on the plains 170 to 190 days, in Svealand 86 to 140 days, and in Götaland 50 to 93 days, except in Skåne where it lies only 47 days.

The snow line and the glaciers are discussed on pp. 19, 20, the freezing of lakes on pp. 27, 29.

FORESTS AND CLIMATE

The influence of the forests on the temperature and humidity of the atmosphere is negligible and on the amount of rainfall too slight to have any practical importance. Forests do, however, regulate the flow of the water on the land, and prevent the rainfall draining rapidly and perhaps destructively to the sea. They cause the water to be retained in the soil and to percolate slowly to the river courses, thus

tending to regulate the flow of rivers and prevent flooding. In some degree forests also preserve the water in the soil by decreasing excessive evaporation.

SEA ICE

A full account of the ice conditions in the Sound and the Baltic generally is given in the *Handbook of Finland*. A general summary of the facts in relation to Swedish ports is given here, and some notes on Norwegian ports are added.

North Sea and Arctic Ocean

The west and north coasts of Norway are never obstructed by pack-ice and the harbours on these coasts are open all the year round. The inner arms of some of the larger fjords as far south as Bergen freeze for a few weeks, but ports near the sea are always accessible. In the exceptional winter of 1917 the fjords between Sognefjord and Hardangerfjord were closed till the end of April. The fjords on the south of Varangerfjord are generally frozen for a distance of 3 to 5 miles from their heads in winter, but Varangerfjord itself remains open. A passage could be kept open to the head of all frozen inlets by an ice-breaker with little difficulty.

In the Skagerak a little drifting pack may be met with in spring, but not in sufficient quantity to interfere with navigation, though from the middle of January to the end of March 1917 the sea was much obstructed. Ports east of the Naze are generally frozen in winter but can always be kept open by ice-breakers. In some cases the channel can be kept clear by ordinary steamers. The channels at the head of Kristiania-fjord leading to Kristiania are always kept clear by ice-breakers.

Kattegat and Sound

These waters are normally open throughout the year, but drifting ice presents some difficulties to navigation. It generally appears in the Kattegat in January in the shallower waters near the Swedish and Danish shores. In calm weather

the formation is rapid on the Swedish coast and the Kattegat may become frozen to such an extent that navigation is practically stopped. This, however, is exceptional, and as a rule steamers can get through even if sailing vessels are prevented. The Sound becomes obstructed a little later although ice formation on the coasts may begin earlier than in the Kattegat. Drift-ice from the Baltic also enters the Sound. In exceptional winter the Sound is completely frozen over. This happened in 1916-17. As a rule the Hälsingborg-Helsingör train-ferry runs all winter with the assistance of ice-breakers.

By the middle of February, or at latest the third week of March, normal navigation is restored in the Kattegat and Sound. The Sound may be obstructed later than the Kattegat. In that case there is generally a passage by the Great Belt.

The Baltic

The ice conditions in the Baltic vary a good deal from year to year. It is exceptional for drifting pack-ice to be found south and south-west of Sweden. From Öland and Gotland northward to the entrance to the Gulf of Bothnia there is generally a good deal of pack especially along the Swedish coast. Navigation can continue uninterrupted in these waters only in exceptionally mild winters. In the severe winter of 1917 all southern Swedish ports except those provided with ice-breakers were closed for two months from the middle of January. The Gulf of Bothnia is frozen every winter. In December ice begins to form along the coasts. By January the coasts north of about lat. 62° N. are blocked but the middle of the gulf remains open. In March the ice has reached its widest extent, and all the gulf except the Åland Sea is frozen. The Åland Sea is frozen in exceptional years; sometimes firmly enough to allow sledge traffic to cross between Sweden and Finland.

The break-up of the ice in spring is slow and depends largely on the prevailing winds. Before the end of March the seas south of the Åland Islands are clear, and a month

later the Gulf of Bothnia is free from ice except the coast north of about lat. 63° N. By the end of May all the ice has gone as a rule but it may linger until June among the islands in the extreme north of the gulf.

OPENING AND CLOSING OF PORTS

The following list gives the extreme dates of closing and opening of certain Swedish and other ports are given. In many years the closed period is shorter. Ports marked with an asterisk (*) are kept open throughout the winter by ice-breakers. The same could be done at other ports south and west of Stockholm if ice-breakers were available.

Torneå (Finland)	Late October—end of May.
Haparanda	November—end of May or early June.
Luleå	Early November—early May or middle June.
Piteå	November—May.
Umeå	Middle to end of November—middle May.
Örnsköldsvik	December—end of April or early May.
Härnösand	Late December or early January—late April or early May.
Sundsvall	Late December or early January—late April or early May.
Stockvik	November—May.
Hudiksvall	Late December or early January—middle of March or April.
Söderhamn	Late December or early January—middle or late April.
Gäfle	Late December or middle of January—middle April or May.
Grisslehamn	January—April.
Stockholm*	Never closed.
Nyköping	Late December—early March.
Oxelösund*	Never closed.
Norrköping*	Never closed to steamers.
Mem .	Early December—middle April.
Västervik	Never closed to steamers.
Slite (Gotland)	Steamers seldom obstructed.
Visby (Gotland)	Closed only in exceptional winters.
Oskarshamn	January—March, except to steamers.
Kalmar Sound*	January—March.
Bergkvara	January and February.

Börgholm	Obstructed December—April.
Rönne (Bornholm)	A few days in January or early February for sailing vessels only.
Karlskrona	Obstructed in February and early March. Never closed to steamers.
Karlshamn	Never closed.
Pukavik	Obstructed January—March.
Horvik	Obstructed January, February, and sometimes March.
Hällevik	Obstructed January—March or early April.
Sölvesborg*	Obstructed January and February. Never closed to steamers.
Åhus	Obstructed December—February. Never closed to steamers.
Simrishamn	Seldom, if ever, closed.
Ystad	Sometimes obstructed in February.
Trälleborg	Never closed.
Malmö	Seldom closed.
Landskrona	Obstructed a few days in January or February.
Hälsingborg	Seldom if ever closed.
Göteborg	Rarely closed even in January and February.
Kristiania*	Always open.
Copenhagen*	Sometimes obstructed for a few days in January and February.

CHAPTER III

VEGETATION AND ANIMAL LIFE

VEGETATION

SCANDINAVIA has a luxuriant vegetation, despite its northern position. As a whole, it lies within the area of coniferous forests which are characteristic of cool temperate regions. The high latitude and the infertility of the soil to a great extent are compensated for by the mildness of the climate, especially in the west, and its summer warmth. While vegetation is most luxuriant, trees, and conifers in particular, are the prevailing feature to far north of the Arctic Circle. Their growth is rendered possible by the fact that winter winds, though strong, are usually mild and moist. The northern limit of trees is principally determined by the régime of the cold dry winds of winter, which make their growth impossible. The resemblance between the vegetation of Norway and Sweden is great, and the differences which occur are due to the westerly exposure of Norway with its milder and wetter climate, and the more southerly extension of Sweden.

Vegetation Regions

The vegetation of Scandinavia may be divided into five regions, which are as follows: (1) region of coniferous forests; (2) region of beech forests (confined to Sweden); (3) region of birch forests; (4) alpine region; (5) Arctic tundra (confined to Norway).

The **region of coniferous forests** comprises the whole of Scandinavia up to the altitude of the alpine zone, with the exceptions of the south-west of Sweden, and of Norway north of Trondhjemfjord. The predominant trees are the Scots pine (*Pinus sylvestris*) and the spruce (*Abies excelsa*). The pine prefers drier ground than the spruce, and goes to

a higher altitude. The pine also frequently survives forest fires which destroy the spruce. These conifers extend from sea-level to 2,500 ft. or 3,000 ft. in Sweden and south-eastern Norway, but in the fjord region of Norway their upper limits sink considerably. The spruce, in fact, disappears except for great forests round Trondhjemfjord, and the upper limit of the pine sinks to 1,000 or even 600 ft.; but in the interior much of the south-west of Norway is above the limit of conifers. Among the coniferous trees in these forests is a sprinkling of lowland birches, rowans, and aspens. These are, in fact, the only trees that can survive the winds on the lee-shores of islands of the west coast. The weather shores of the coast lands are bare. In the south-east of Norway and in central and southern Sweden, including Gotland, a great many deciduous trees are mixed with the conifers, but seldom to such an extent as to put the pines and spruces in the minority. Such deciduous trees are the oak, ash, lime, maple, and elm; but they are not found at greater altitudes than 1,600 ft. The oak ceases about lat 61° N. in the interior and lat. 63° N. in coastal regions. Throughout the coniferous region there are places where less soil than elsewhere results in thin woods or the absence of trees. In such places are juniper, heather, cowberry, and other bushes. In badly drained parts great bogs occur, in which sphagnum moss luxuriates. These are specially frequent on the wetter west coasts, and abound in bilberry, blaeberry, and mountain raspberry or cloudberry. Bilberries are also found in spruce woods, and the whortleberry occurs in pine woods. Reindeer 'moss' and other lichens occur on rocks and stony places and in the northern coniferous woods. Some scattered spruces go as far north as lat. $69^{\circ} 30'$ N. in the valleys of the Tanaelv and Pasvikelv, but the pine forms small forests even in lat. $70^{\circ} 30'$ N. In central Sweden and in the lowlands of the south most of the mixed deciduous and coniferous forests have given place to agricultural land, and the same is true, though to a less extent, of south-eastern Norway. In the rest of Norway and in Dalarne and Norrland in Sweden the timber industry and forest fires have depleted

the pine and spruce woods along and near the course of streams that are suitable for floating timber to the coast (see Chap. XIII).

The **region of beech forests** is confined to Skåne, southern Öland, and the shores of the Kattegat, in Sweden. The oak is mixed with the beech. These are the forests which originally covered the greater part of Denmark. In Sweden they have become very much restricted through cultivation.

The **region of birch forests** occurs in both Norway and Sweden at a higher altitude than the coniferous forests. Above 2,600 or 3,000 ft. in the south of Scandinavia the birch is the only forest tree, and extends to 3,000 or 3,500 ft. There are a few rowans, aspens, and wild cherries in the birch forests, and considerably more undergrowth than in the pine forests, for the birch forests are more open and allow more light to reach the ground. North of Trondhjemfjord, along the coast of Norway up to the far north, birch woods extend from sea-level up to 1,300 ft or 1,600 ft., and to 2,300 ft. in inland valleys. In that region there are no other forest trees except occasional pines. At higher elevations the birch occurs as a shrub. In these low birch woods the wild strawberry and wild raspberry are common and the mountain raspberry or cloudberry far from rare but localized. Dwarf birches grow as far north as 70° 40' N. lat.

The **alpine region** begins above the birch forests, at 1,600 ft. in the north and over 3,000 ft. in the south. It reaches the altitude of eternal snow. The alpine region covers a large area in Norway, but a comparatively small one in Sweden. There are no trees, but heather is abundant as well as low-growing willows, the dwarf birch, the juniper, the blaeberry, and the cowberry. In more exposed plates and where soil is almost absent, there is little but lichens. Reindeer 'moss' smothers what few bushes occur. And yet even in the bleakest and most windswept spot an Arctic poppy or a saxifrage may contrive to hold its own.

The **Arctic tundra** finds its western limit in Europe in the coastal regions of Finmark. Trees are absent and the bushes

that occur are low-growing. Grasses and sedges are most common, but the tundra is bright with flowers in summer and there are many berry bushes. The tundra affords summer pasture for reindeer.

Economic Plants

With the exception of the forest trees (see Chap. VII) there are no native plants of economic value in Scandinavian lands. But the seaweeds which abound on the west coasts of Norway and Sweden are valuable. In the Baltic the low salinity of the water does not favour their growth. The tangle or laminaria is the most important sea-weed, and comes ashore in great quantities after an on-shore gale. It has considerable value for the salts of iodine which it contains.

From the point of view of food the many berry-bearing bushes of Scandinavia have importance. The blaeberry, cowberry, whortleberry, mountain raspberry, wild strawberry and others abound in all northern parts and are universally eaten in summer and autumn and preserved for winter use. They are not cultivated.

Peat

Peat bogs are extensive in both countries. An estimate given for Norway of 4,630 sq. miles is certainly too low. Sweden has about 15,000 sq. miles, which are calculated to contain 8,000 million tons of peat. Both in Norway and Sweden peat is used for fuel. The calorific power is about half that of coal. In Norway the industry of compressing peat for domestic use is making progress, stimulated by the present scarcity of coal. Swedish attempts to refine peat in order to make more valuable fuel are meeting with some success (see Chap. X). Peat is also used for moss litter.

ANIMAL LIFE

Mammals

The animal life of Scandinavia shows close relationships with that of central and western Europe and includes also

some Arctic species. The bear occurs in the forests, but it is becoming rarer and its range is restricted to the remoter parts of Norway and Sweden, including the region north of Trondhjemfjord. During the first four years of this century over 100 were killed in the north of Sweden. In 1915 only two were killed. The lynx also occurs in unfrequented forests in mountainous districts. The glutton or wolverine lives in the northern forests. The wolf, which is a worse enemy of the reindeer than the glutton, has decreased greatly in numbers during the last half-century, but is not rare in northern Norway, especially in Finmark and in northern Sweden. In 1915 the number killed in Sweden was 48. Half a century ago they were common in southern Scandinavia. In the hope of exterminating the bear, lynx, glutton, and wolf, the Scandinavian Governments used to pay a bounty for each head. The bear is now protected in the crown lands of northern Sweden and the bounty for the lynx is no longer given. The Arctic fox, which has a white coat in winter, is confined to the mountains of the north, and only comes to the lowlands in years when the lemmings migrate. The common fox is found in the south; 15,127 were killed in 1915. The common hare, the ermine, and the weasel occur throughout the country, but the ermine is becoming rare. The hare turns white in winter. The beaver is almost exterminated in Norway, but a few remain in the Nisserelv and are now protected by the State. The badger is found in the south and the pine-marten in the coniferous forests. The lemming is a small rodent, with peculiar habits of migration. It is about 5 in. long, covered with soft brown fur spotted with dark brown and black. Its feet are adapted for scratching and digging. The usual home of the lemming is in the mountains, both north and south, but except in Finmark they do not habitually live at sea-level. Their food is entirely vegetable. At intervals varying from 5 to 25 years they migrate towards lower land in vast numbers, pouring over all obstacles and steadily pursuing their course, swimming rivers and lakes and consuming any crops they

encounter. Wolves, foxes, bears, stoats, weasels, hawks, and owls hang on the trail of the advancing horde, destroying great numbers. Even reindeer, cattle, and goats join in the chase, and man is not behindhand. Nothing stops the stream of lemmings although their advance is slow and only by night. When they reach the sea they plunge in and, swimming onwards, perish in the waves, no doubt under the impression that they have encountered another lake or river.

There are three species of deer. The roedeer is found in the south of Sweden and in the western coastal districts of Norway as far north as Namdal (about $64^{\circ} 30' \text{ N. lat.}$). There are many on the island of Hitteren. The elk, which is becoming rare, used to inhabit all the forests of Sweden and Norway as far as $66^{\circ} \text{ N. lat.}$ The reindeer occurs wild in Finmark and in the Hardanger Vidda and Romsdal, but not in Sweden. The shooting of wild reindeer is prohibited. Many of the apparently wild reindeer in Finmark are really claimed by the Lapps. Herds of tame reindeer occur in the north of Norway and Sweden and to a less extent in southern Norway. They are practically the sole source of livelihood to the Lapps. For further information concerning reindeer see p. 145.

The most important whale in Norwegian waters is the rorqual or finner (*Balaenoptera*). Finners appear on the coast of Finmark in January to March, following the shoals of capelan on which they feed. They disappear in April and May and return in June, remaining until the autumn. Among the finners the chief species is the blue whale (*B. Sibbaldi*), which attains a length of 80 to 85 ft. and is the largest whale known. It appears off Finmark from June to August. The true finner (*B. musculus*), 60 to 65 ft. long, appears from March till August on the same coast, and the smaller seiwhale or fish-whale (*B. borealis*), 40 to 50 ft. long, comes in June to September. Another whale on the north coast is the bottlenose (*Hyperodon diodon*), which is only 20 to 30 ft. long. They leave the northern seas for the Atlantic in autumn. The caaing whale (*Globiocephalus melas*), about 25 ft. long, extends along the whole

coast of Norway and in the North Sea. The humpback (*Megaptera boops*) appears off Finmark in February and March. The white whale (*Delphinapterus leucas*), about 20 ft. long, is a small Arctic species found in the north of Norway, where it enters the fjords.

These are the chief species that frequent Norwegian waters, but the grampus, or killer (*Orca gladiator*), several other kinds of finner, and various dolphins occur. The Atlantic right or bowhead whale (*Balaena biscayensis*), the narwhal, and the walrus are not found in Scandinavian waters. The porpoise is the only whale in the Baltic. For the whale fisheries see Chap. VIII.

Seals are common on the coasts of Norway and Sweden, including the common seal, the grey seal, and the greenland or harp seal. The first also occurs in the Baltic. There are no fur seals. Seals are held by fishermen, and probably with much justification, to do much damage to the fisheries. In 1915 the number killed in Swedish waters was 3,271.

Reptiles

There are a number of small snakes and lizards, but the common viper, which has its northern limit about the Arctic circle, is the only poisonous species.

Birds

Bird life is very abundant in summer, for most of the species are migrants who spend their winter in more southern latitudes and come north to nest in summer. In these species the south of Scandinavia is richer than the north. There are resting-places on the coasts of Skåne, Halland, and Öland, which are particularly animated in spring. In winter, on the other hand, some Arctic species come south to Scandinavia from Spitsbergen and Franz Josef Land.

The birds of the lowlands are very similar to those of Europe in general, including the thrush, the kestrel, the green woodpecker, the skylark, the jackdaw, the goldfinch, the corncrake, the wren, and many others. More characteristic of Scandinavia

are the Lapland and snow-bunting, the ptarmigan, capercailzie, the wild swan, the snowy owl, the willow-grouse, the golden eagle, and several kinds of duck, geese, and plovers. Sea-birds swarm along the coasts of Norway, including gulls, terns, guillemots, razorbills, puffins, kittiwakes, cormorants, and eider-ducks. In the north, bird rookeries are particularly numerous and cover whole islands.

Fish

Fish occur in most of the rivers of Norway and Sweden. Salmon occurs in many of the large rivers and is also caught along the coasts and in many lakes. Trout, red char, pike, and perch are found in the rivers of the north of Norway and Sweden. The Norwegian coasts swarm with fish, including the cod, herring, mackerel, sprat, and many flat-fish. The Greenland shark occurs in the fjords and coastal waters. The fresher waters of the Baltic are not favourable to marine species, but the cod, several flat-fish, the eel, and a variety of herring occur. On the other hand many of the freshwater species of Sweden, as of Finland, are found in the Baltic. For a further account of Scandinavian fish see Chap. VIII.

Insects

Among insects the only one of importance is the mosquito, which is a plague in low-lying parts in the north during summer, and drives the reindeer to the higher pastures.

CHAPTER IV

INHABITANTS

Population of Norway—Characteristics, &c., of Norwegian population—Norwegian language—Religion (Norway)—Education (Norway)—Population of Sweden—Characteristics, &c., of Swedish population—Swedish language—Religion (Sweden)—Education (Sweden)—The Press—Emigration from the Scandinavian peninsula—The Lapps.

POPULATION OF NORWAY

Numbers and Distribution

A DECENNIAL census is taken in Norway. According to that of 1910, the total population was 2,357,790, and in 1916 it was estimated to be 2,497,304. The following table gives, for 1910, the population of each *amt* or county, together with the average population, rural and urban, per square mile. Division and district names in common use are also indicated.

	Pop. 1910.	Pop. per sq. mile.		Districts.
<i>Östenfjeld</i>		<i>Rural.</i>	<i>Urban.</i>	
Smaalenene	150,690	69.2	6,557.1	} Östland
Akershus	129,323	65.6	5,653.4	
Kristiania	242,850	—	39,164.5	
Buskerud	123,863	16.7	1,269.9	
Jarlsberg and Larvik	103,333	76.5	7,227.3	} Opland
Hedemark	133,485	12.4	10,972.3	
Kristians	118,901	11.9	5,249.5	
Bratsberg	106,791	13.6	4,901.2	} Sörland
Nedenes	71,272	15.8	2,622.8	
Lister and Mandal	77,237	20.7	3,548.9	
<i>Vestenfjeld</i>				
Stavanger	137,581	23.8	11,668.3	} Vestland
Søndre Befgenhus	134,328	23.0	—	
Bergen	83,173	—	6,417.0	
Nordre Bergenhus	88,943	12.7	5,061.3	
Romsdal	143,102	19.4	7,092.0	} Trøndelag
<i>Nordenfjeld</i>				
Søndre Trondhjem	147,525	14.7	3,535.1	} Nord Norge
Nordre Trondhjem	84,608	9.6	10,950.6	
Nordland	161,105	10.6	2,035.7	
Tromsö	80,554	6.9	19,900.0	
Finmark	39,126	1.7	2,285.7	

Population is largely restricted to the valleys and coast districts, and is most numerous in the southern area (Trondhjem Fjord to Skagerak). The four northern divisions—Finmark, Tromsö, Nordland, and northern Trondhjem—with an area three-sevenths of the area of Norway, contain little over 15 per cent. of the entire population.

The following towns had more than 8,000 inhabitants in 1910 (their estimated population in 1916 is added within brackets) :

Kristiania	241,834	(257,211)
Bergen	84,330	(90,300)
Trondhjem	45,335	(51,904)
Stavanger	37,261	(44,093)
Drammen	24,895	(25,500)
Fredrikstad	15,597	(16,450)
Kristiansand	15,291	(16,620)
Aalesund	13,858	(16,000)
Kristiansund	13,201	(14,800)
Haugesund	12,987	(16,700)
Fredrikshald	11,992	(12,200)
Skien	11,856	(16,100)
Sarpsborg	10,542	(12,700)
Arendal	10,315	(10,875)
Larvik	10,105	(10,500)
Horten	9,817	(10,600)
Tönsberg	9,769	(11,500)
Moss	8,648	(8,800)
Tromsö	8,145	(9,200)

Vital Statistics

The excess of births over deaths is remarkably high, but has tended to diminish. The yearly average was over 13·3 per thousand inhabitants during the decade 1901–10. In 1911 the excess was 12·6 per thousand; in 1912, 12·3; in 1913, 12·15; in 1914, 11·7. Provisional figures for 1915 and 1916 are 10·45 and 12·7.

The average yearly death-rate was 14·12 per thousand inhabitants during 1901–10; 13·25 during 1911–14. This death-rate is exceptionally low. At the same time the birth-rate is extremely high: the average yearly birth-rate was 27·20 per thousand inhabitants during 1901–10; and 25·15 during 1911–14.

The percentage of illegitimate births was high during the third quarter of the nineteenth century, but fell during the last quarter. Of the total number of living children born in 1901-10, 6·87 per cent. were illegitimate ; in 1911-14, 6·96 per cent. In 1915, the number of births was 58,728 ; of which 4,293 (or 7·31 per cent.) were illegitimate. Since the last quarter of the nineteenth century, the number of marriages has increased in relation to the number of the population. Within the same period the number of children born dead has slightly decreased.

The proportion of women in the country was extremely high in 1769 ; there were 1,098 women to 1,000 men. The ratio fell, until in 1845 there were 1,037 women to 1,000 men. Partly, no doubt, in consequence of the emigration of greater numbers of men, the proportion has risen, until in 1890 there were 1,072 women, and in 1910, 1,070 women to every 1,000 men.

CHARACTERISTICS, &C., OF NORWEGIAN POPULATION

The people of Norway are mostly of the North-European or Germanic type ; somewhat long-headed and blond (they are the fairest of European peoples). This North-European race brought to Norway the Aryan (Germanic) language from which modern Scandinavian languages are derived. An ancient population of Lapps (*Finner* in Norwegian ; see p. 83) has retained a separate existence in the north of Norway, and has given its name to the district of Finmark. Other Lapps and Finns have also settled in the north, and nomadic Lapps move over large tracts of otherwise uninhabited country.

In addition to these racial types, short-headed types of uncertain origin are found, especially along the southern and south-western shores. These may belong to the Mid-European (or Alpine) race.

From statistics of military recruits it appears that the Norwegians are among the tallest men of the world, and that they are proportionally well built. The average height of recruits in 1878-80 was 5 ft. 6·14 in. ; it has increased, until

in 1907 it was 5 ft. 7·4 in. The tallest men came from the region immediately south of the polar circle (the north of northern Trondhjem, and south of Nordland) : their average height was about 5 ft. 8·9 in. The population is improving physically, notwithstanding the loss of good elements by emigration.

The nature of their land forces the Norwegians to take to the sea. Their superiority in shipbuilding was the source of their strength in the viking days, when they made themselves feared by most of the sea-board peoples of Europe. The vigour and adventure of those days left a permanent result in the saga-literature, which had its chief home in Iceland, but was common also to Norway. This literature has had no small influence upon Norwegian life and character down to the present day. Verse-making was an accomplishment of the Norwegians, even before the time of the sagas. Folk verses are preserved in Norway down to the present day. Certain types of decorative art are also survivals of ancient times. In this matter also old traditions are jealously guarded. The costume of peasants in various districts is derived from types of clothing worn in past times. Building probably also follows an old type ; but few mediaeval houses, with hearth in the centre and a hole in the roof, remain. The custom of having separate buildings for the various purposes of a farm probably comes from the ease with which wooden buildings could be erected. Even in small towns, houses are still mostly built of wood ; but wood is gradually giving place to brick and stone, because of frequent fires, which are disastrous in a wooden town or farm-steading. Old types of boats survive. Square-sailed boats were commonly used, down to the nineteenth century, in the districts of the fjords ; but in the south and east the sprit-sail was introduced, and it has now been adopted in the north also. Deeked fishing-boats have for sea-fishing superseded the open boat, which was formerly used for all purposes. Survivals of the viking boat are in use in Nordland and Nordre Bergenhus ; but the ten-oared boat of this type, formerly characteristic of Nordland, is gradually

becoming obsolete. The introduction of motors promises to alter greatly the type of boats in use.

The constant struggle against conditions more or less unfavourable to existence fostered a spirit of independence and self-reliance. The independence of the Norwegian character is said to cause lack of diligence in work. Fits of activity, in fact, alternate with periods of comparative idleness in rural life. The complaint was often made, formerly at least, that the quality of industrial production in Norway was low.

The rarity of large agricultural areas limited the number of manorial estates in ancient times. The land was divided into great numbers of small farm-holdings, occupied by *bönder* (farmers or peasant-proprietors). The authority of the feudal lord could less easily be enforced than in more level and accessible country: the small farmers had a somewhat more independent position in society in Norway than in other lands. When they were oppressed, they frequently rebelled. Their power turned the scale in civil wars. The semi-independent position of the early *bönder* has had its influence upon the political history of Norway. It may safely be said that Norway is one of the most democratic countries of Europe. By *odal* tenure, farms were secured to the possessors and to their heirs. The more valuable part of the land had nevertheless passed, at the end of the Middle Ages, into the hands of the most powerful families, and to the Church and State. During the last three centuries these large estates have to a great extent been parcelled out again by sale; so that there is again a large element of peasant-proprietors in Norway. In the eastern region farmers with wide lands have become a powerful section of this class.

Relatively to the populations, Norway consumes normally about a third as much alcohol as do the British Islands; one quarter as much as Germany. The consumption of alcohol was very much higher in the second quarter of the nineteenth century, and there was a considerable amount of drunkenness. Restrictive legislation has reduced this evil; and with the reduction in the use of alcohol, convictions for theft have also

diminished in number. Nevertheless crimes of brutality have increased in number ; and there is still much drunkenness in the towns.

In 1914, 78,599 persons in Norway received state-relief in some form in 1914, on the ground of poverty. Of these, 16,097 were in Kristiania ; 5,414 in Nordland ; 4,221 in Hedemark. The sum paid on poor-relief in that year was 14,050,374 kroner (about £790,000).

NORWEGIAN LANGUAGE

The modern literary language of Norway resembles modern Danish : the difference is merely dialectical. There was a much greater divergence between the languages of Norway and Denmark in the twelfth and thirteenth centuries than there is between the written languages of these countries from the eighteenth to the middle of the nineteenth century. Among the Scandinavian languages, Swedish and Danish form the eastern group. The inflexions of Danish have from early times been greatly broken down, in part perhaps through intercourse with England, where intercourse with Danes was one of the influences that weakened Anglo-Saxon inflexions. The West Scandinavian group included Old Norwegian and Icelandic. The old inflexions have survived with little change in Iceland, but have been lost or greatly modified in the Scandinavian countries. Norway failed to retain a standard literary language : the Norwegian speech, originally identical with Icelandic, split up into dialects. From the time of the Reformation Norway adopted literary Danish as its standard. Down to the middle of the nineteenth century, educated people in Norway strove to write and speak Danish correctly. In Norway, however, Danish (*rigsmaal*) was modified by the Norwegian dialects. Norway admits many words that are foreign to Denmark ; and spells other words in accordance with her own pronunciation, which differs on certain lines from Danish pronunciation. Out of the Norwegian local dialects a literary language (*landsmaal*) has been composed. It has been suggested that this more or less artificial language should

displace in Norway the Danish dialect that is domiciled there. The south-eastern region, being the nearest to Denmark, opposes this suggestion. The southern shores approach most nearly to Denmark in their speech. Landsmaal is placed by law on an equal footing with rigsmaal. In the district of Bergen, where the local dialects resemble landsmaal most closely, landsmaal was in 1915 the language used in the schools of 51 communes, and in some schools of 37 communes ; the remaining 27 communes preferred rigsmaal. The more moderate supporters of the landsmaal hope that it will influence the existing literary language of Norway, and, without supplanting it, will mould it more into accordance with the character and speech of the Norwegian people : and that uniformity may be reached by reaction of the literary language upon the popular speech. As yet, however, the most apparent result is absence of uniformity.

RELIGION (NORWAY)

The State religion of Norway is the Evangelical Lutheran Church. This is based upon the Apostolic, Nicene-Constantinopolitan, and Lutheran creeds ; the Augsburg (1530) Confession ; and Luther's Shorter Catechism. To these standards the king and his councillors are bound to adhere ; as well as the clergy, theological professors, and religious instructors ; the principals of secondary schools and superintendents or inspectors of primary schools. Parents who belong to the State Church must bring up their children in adherence to it.

The king of Norway, acting through his government departments, is the head of the Norwegian Church. Norway is divided into 6 dioceses (Kristiania, Hamar, Kristiansand, Bergen, Trondhjem, Tromsö), and 86 archdeaconries or deaneries (*provstier*). The bishops are nominated by the clergy but appointed by the king, who also appoints the archdeacons (usually nominated by the parish priests of the archdeaconry), and the lower clergy.

The administration is carried on by the Church Division of the Church and Education Department, served by six offices :

(1) the Office for Church and Clergy, controlling all constitutional matters, and the duties, rights, and remuneration of the clergy; (2) the Rectories' Office (*Prestegaardskontoret*); (3 and 4) the First and Second Fund Offices; (5) the Office for Poor Relief and Public Institutions; and (6) an Office of Revision for Public Institutions.

Members of other Christian communities, Unitarians, and Jews, are permitted to celebrate religious offices and to assemble in public, without closed doors. Religious houses are not banned, but Jesuits are excluded from the kingdom. There are not many dissenters in Norway (62,553 in 1910), though the number has increased. The Evangelical Lutheran Free Church is strong, but its numbers are not stated. The Methodists numbered 10,986; the Baptists, 7,659; Roman Catholics, 2,046. There are also some Adventists, Mormons (714), Quakers (143), and Jews, and a few inhabitants profess no religion.

EDUCATION (NORWAY)

Public education is under the control of the Education Division of the Church and Education Department. This division acts through three offices. The first School-Office controls the affairs of schools for abnormal children, and of reformatories; public academies, and commercial schools; libraries, museums, and exhibitions of art; copyright, and literary and artistic matters, including the learned societies. This office publishes historical texts, and contributes to other publications, including state grants to periodicals; and administers also certain funds. The second School-Office controls affairs of the University, the Meteorological Institute, secondary schools, the Technical College, and the technical schools. The third School-Office controls affairs of elementary schools, schools for the education of teachers, county schools, and *gymnasias*; and schools of industry, handicraft, and household industries. There is also an Educational Council: a consultative body working in association with the education division. The Educational Council inspects schools that apply for recognition by the State, and is responsible for the manage-

ment of the leaving examinations. Local administration of primary public schools is carried on by the School Boards. These are composed of at least one priest ; the chairman (or one of the aldermen) of the Municipal Council ; one teacher of each sex, chosen by the teachers ; and members chosen by the Municipal Council. Of these last members, at least one-half must have children attending the public school. When the School Board controls secondary schools also, the secondary school teachers also elect one teacher of each sex. Clergymen were formerly members of the board by right of their office ; three clergymen may still be nominated as members by the bishop. The chairman was formerly a clergyman, but is now elected by the board. Each public school has its Inspection Committee of five members. Parents of children attending the school elect three members of this Committee. A fourth is a priest, appointed by the bishop ; the fifth is a member elected from the School Board and is chairman of the committee.

The School Board appoints inspectors and teachers. There is also a County School Board in each county. It is composed of three members elected by the County Council. There are seven School Directors for the superintendence of primary schools : two for the diocese of Tromsö, and one for each of the other dioceses. The bishop and archdeacon also superintend, and the parish priest supervises religious instruction. A director is appointed for the schools for deaf, blind, and consumptive children.

Education in Norway is compulsory and free. Books and other materials are generally obtainable without cost. In the larger towns a free meal is provided for the children of poor parents. The age of compulsory attendance is $6\frac{1}{2}$ to 14 years in the towns, 7 to 14 in country districts. In the country children must frequently go 2 or 3 miles to reach their district school ; in Finmark, even 6 miles or more. The ways are often difficult or dangerous, and, in winter, dark. Children must sometimes go to school in boats, and in winter frequently on ski. In many country districts pupils attend for only 15 or 12 weeks in the year. The term is, however, prolonged by the

fact that schools meet in these places on few days of the week. The classes are usually small, so that individual training can be given. In the most remote places, teachers go from one district to another, taking successive terms in different schools. In towns the conditions are more favourable, and education is satisfactory.

The educational system is carefully organized. The first year of the Middle-School is of the same initial standard as a sixth year of the primary school. Secondary education in Norway consists of 4 years in a Middle-School and 3 years in a *gymnasium*. The Middle-School examination must be passed before a pupil may enter a *gymnasium*; and the leaving examination (*Examen Artium*) must be passed before a student may enter the University. These examinations are held in writing and orally. The Middle-School examination includes among its subjects religious knowledge, Norwegian (*rigsmaal* and *landsmaal*), German, English, history and geography, elementary zoology, botany, physiology, and mathematics. Latin may be begun in the second year of the *gymnasium*; Greek is not taken up before the student reaches the university.

A noteworthy feature of the Norwegian system is the recognition and aid given by the State to those private schools that give a sufficiently high standard of training. Private secondary schools retain an important place in Norwegian education, and have in some places increased in number; they flourish especially in Kristiania and Bergen. Individual initiative in these private schools has had important influence upon Norwegian public education.

In 1914-15, 97,681 children attended the public primary schools in the towns; 284,690 in the country districts (which are divided into 6,027 school circles). There were 39 secondary county schools and 32 private high schools and *gymnasia* in the country. There were in the towns 93 secondary schools (*Höiere Almenskoler*) with the right of holding the Middle-School examination (including 25 private schools, 10 of them for girls only). Of these 93, 20 had the right of holding the leaving examination (including 6 private schools). There were

also 101 secondary schools without the right of holding that examination : 98 of these were private schools. These 194 schools were attended by 27,245 pupils, of whom 12,613 were taught in the private schools.

Grants made by the State to the higher schools permit the fees to be lowered, so that the pupils pay less than the cost of their education. When more than one child of a family attends the same school, a further reduction is made. Fees are remitted in whole or in part, to many pupils who cannot afford them.

There are also : a school for the army (in Kristiania) ; a school for the navy (in Karl-Johansvaern) ; 4 higher commercial schools (*Handels-gymnasier*) ; 3 higher and 3 lower technical middle-schools ; and 87 other professional schools, not counting a few schools of art.

The Agricultural College of Aas had 177 students in the year 1916-17 ; the Technical College of Trondhjem, 669 students.

In 1916 there were eleven institutions for the education of abnormal children (deaf, blind, and consumptive) ; and also nine reformatories, and four communal detention schools.

The University of Kristiania was founded in 1811, and played a great rôle during the nineteenth century. It had in 1916 about 1,500 students, and 74 professional chairs. The University Funds probably exceed £140,000. Its revenues for the year 1915-16 amounted to 1,167,515 kroner (about £65,000).

The principal seats of education of the clergy were formerly the episcopal centres, Trondhjem, Kristiania, and Bergen. There are in Kristiania a Training College of practical theology, and a Training College for teachers of secondary schools. Norway has six public and four private schools for the education of teachers of primary schools.

POPULATION OF SWEDEN

Numbers and Distribution

A decennial census is taken, and in addition a fairly close annual enumeration is made in normal times. By the census of 1910 the total population of Sweden was 5,522,403, and according to the enumeration at the end of 1914 it was 5,697,607.

The following table gives, for each of these years, the population of each *län* or administrative division, together with the average population per square mile. Inasmuch as the old provincial names are still in common use, in preference to those of the existing administrative divisions, these names are added in the last column to show the approximate relation (it is not exact in every case) between the two systems of division. The last column also shows the three old main territorial divisions, Norrland (northern), Svealand (central), and Götaland (southern).

<i>Län.</i>	<i>Pop.</i> 1910.	<i>Pop.</i> 1914.	<i>Pop.</i> <i>per sq.</i> <i>mile,</i> 1914.	<i>Old Provinces.</i>
				<i>Norrland—</i>
Norrbottn . . .	161,132	171,759	4.2	Lapland, Norrbotten
Västerbotten . . .	161,366	168,378	7.4	Lapland, Västerbotten
Västernorrland . . .	250,512	258,683	6.2	Ångermanland, Medelpad
Jämtland . . .	118,115	122,902	6.2	Jämtland, Herjedal
Gäflleborg . . .	253,792	258,955	34.0	Helsingland, Gestríkland
				<i>Svealand—</i>
Kopparberg . . .	233,873	241,183	20.9	Dalarne (Dalecarlia)
Värmland . . .	260,135	260,327	34.9	Värmland
Örebro . . .	207,021	211,808	60.1	} Vestmanland Nerike Södermanland Uppland
Västmanland . . .	155,920	161,092	62.2	
Södermanland . . .	178,568	183,450	69.8	
Uppsala . . .	128,171	131,751	67.2	
Stockholm, rural . . .	229,181	225,787	75.3	}
Stockholm, urban . . .	342,323	386,270	8,778.9	
				<i>Götaland—</i>
Östergötland . . .	294,179	299,561	70.2	} Östergötland Västergötland Dal
Skaraborg . . .	241,284	241,129	73.7	
Älvsborg . . .	287,692	292,888	59.6	
Göteborg och Bohus . . .	381,270	400,668	205.7	Bohuslän
Halland . . .	147,224	147,015	77.4	Halland
Jönköping . . .	214,454	218,063	49.0	} Småland
Kronoberg . . .	157,965	156,863	41.0	
Kalmar (with Öland Island) . . .	228,129	227,529	51.1	
Blekinge . . .	149,359	150,499	129.3	Blekinge
Kristianstad . . .	228,307	234,554	94.1	} Skåne
Malmöhus . . .	457,214	472,968	253.6	
Gotland Island . . .	55,217	55,525	45.5	Gotland

Density of Population.—The distribution of the population is uneven. About one-half the total area of the country has on an average less than 13 inhabitants per square mile; the other half has more than 60. A density of 130 persons or more per square mile is found principally in urban and industrial areas—as for example in the vicinity of Stockholm and the parts around Lake Mälaren, the mining areas of central Sweden and Norrland, the south-central industrial districts, and the southern coast lands of Malmöhus, Blekinge, Halland, and Göteborg. It is only in these southern districts that purely agricultural districts are found to be so thickly peopled. The most thinly populated region, on the other hand, extends in a broad belt from the angle between the Norwegian and Finnish frontiers in the north, along the Norwegian frontier as far as Jämtland. Here a more densely inhabited belt extends along the Jämtland railway (which crosses the frontier to Trondhjem in Norway), but south of that all the interior parts of Jämtland, Gäfleborg, and Kopparberg are very thinly populated. Eastward towards the coast of the Gulf of Bothnia, and southward, the density of the population increases, but throughout Norrland by far the larger proportion of the population is concentrated along the coast and in the valleys, leaving extensive upland tracts which are almost or entirely uninhabited. To the south of a line extending, roughly, from Gäfle to the Norwegian frontier east of Kristiania such sparsely inhabited uplands are much less extensive, and the average density of population south of this line, and northward along the coast as far as Umeå, is usually not less than 25 per square mile. In Västerbotten and Norrbotten (northern Norrland) the most densely inhabited parts are in the neighbourhood of the ports of Umeå, Skellefteå, Luleå, and Haparanda, and inland in the isolated communities which have collected at the iron-fields of Gällivara and Kirunavara.

Urban and Rural Population

The urban population of Sweden is only about 26 to 27 per cent. of the whole, leaving 73 to 74 per cent. for the rural

(agricultural and forest-working) population. This may be contrasted with the percentage of 36 which has been calculated for the urban population of Europe as a whole: the percentage rises in western Europe (excluding Scandinavia) to nearly 50.

The following towns had more than 10,000 inhabitants at the end of 1914:

Stockholm .	386,270	Halmstad .	18,527
Göteborg .	181,500	Sundsvall .	16,668
Malmö .	108,004	Landskrona .	16,555
Norrköping .	45,934	Kalmar .	15,917
Gäfle .	35,937	Uddevalla .	13,261
Hälsingborg .	35,235	Södertälje .	12,808
Örebro .	33,780	Falun .	12,068
Eskilstuna .	29,167	Ystad .	11,998
Karlskrona .	28,127	Kristianstad .	11,858
Jönköping .	28,069	Söderhamn .	11,591
Uppsala .	27,773	Västervik .	11,007
Linköping .	24,966	Trälleborg .	10,788
Västerås .	23,227	Nyköping .	10,781
Borås .	23,158	Visby .	10,061
Lund .	22,578	Härnösand .	10,040
Karlstad .	18,673		

It may be observed that the only towns in the above list which lie north of the Gäfle-Kristiania line previously referred to are the important timber ports of Sundsvall, Söderhamn, and Härnösand. Before the rise of modern industries the towns, apart from their importance as centres of agricultural districts, subsisted chiefly on commerce, and the greater number are therefore situated by the sea, or near the great lakes from which there is easy access to the sea. The Baltic coast towns (not including those along the Gulf of Bothnia) contain about 40 per cent. of the whole urban population; the west coast towns contain about 25 per cent.

Vital Statistics

The annual excess of births over deaths is high, the proportion being as 1.73 to 1 in the period 1901-10. This proportion is surpassed in few European countries, though both Norway and Denmark are among these. The birth-rate between 1876 and 1900 was 28.51 per thousand, but the number of births

declined regularly from 1909 to 1914, and the rate in 1914 fell to about 22·75 per thousand. The death-rate between 1891 and 1900, 16·36 per thousand, was lower than that of any European country over such a period: in 1901–10 the rate, 14·9, was higher than that of Norway and Denmark; in 1914 it was about 13·76 per thousand. The percentage of illegitimacy is rather high, though it decreased during the second half of the nineteenth century; the percentage of married persons is lower than in most European countries.

A demographic division of Sweden has been made as represented in the following table, and though it has been modified of recent years and should not be interpreted too exactly, it is suggestive of the different conditions prevailing in the three main divisions of the country.

	<i>Marriages.</i>	<i>Birth-rate.</i>	<i>Illegitimacy.</i>	<i>Death-rate.</i>	<i>Surplus of births.</i>	<i>Emigration.</i>
(a) South Sweden: Eastern part	Numerous and early	Low	High	High	Low	Little
(b) South Sweden: Western part	Few and late	High	Low	Moderate or Low	High	Large
(c) North Sweden	Moderately numerous	Very high	Low	Low	Very high	Moderate

The excess of women over men is rather high: in 1914 it was as 1,045 to 1,000. The figures of emigration (below) afford a partial explanation of this.

Non-Swedish Population

The average annual number of immigrants in 1907–14 was 8,379, fluctuating little.

According to the census of 1910 there were 21,708 foreign subjects in Sweden, including 8,438 Russian subjects, 4,537 Norwegians, 3,400 Germans, 2,900 Danes, 816 Americans, 288 British.

In addition to these foreign subjects there are in Sweden a considerable number of Finns and Lapps who are Swedish subjects.

Finns.—The total number of Finns in Sweden was 25,268 in 1910. They are found mostly in Norbotten (24,755), and,

especially, close to the Finnish frontier, where they form a well defined and compact group in the valley of the Torne (the frontier river) and the adjacent country nearly as far west as the Kalix (the next great river westward); here they are found principally in the coast-land division, where they numbered 17,432 in 1910, while Swedes numbered only 4,528. In the inland division of Torneå there were 3,480 Finns (7,784 Swedes), and in the Gällivara district 3,049 Finns (12,659 Swedes).

Though they are called Finns and speak Finnish, their origin is in some doubt, and certain authorities maintain that it is Swedish, but that through centuries of closer intercourse with the Finnish-speakers to the east than with the Swedish-speakers to the south they adopted the language of the former. Of late years, however, with the improvement of communications between southern Sweden and Norrland, and the growth of the Swedish-speaking population in coast towns such as Luleå, and the iron-mining centres of Gällivara and Kirunavara, the Swedish language has noticeably spread in the Finnish districts, and the Government has taken special measures to foster this movement, principally by means of a liberal support of public education. It is stated that the Finnish-speaking element, as a whole, welcomes the opportunity of acquiring the Swedish tongue.

Lapps.—See p. 83.

CHARACTERISTICS, &C., OF SWEDISH POPULATION

The Swedish people is of pure Germanic origin. The leading physical characteristics are light hair, broad high forehead, and blue or grey eyes, and the Swedes are usually well-built, and are on the average one of the tallest peoples in the world. The average height of males between the ages of 30 and 35 years is nearly 5 ft. 8 in. Military statistics are stated to prove a regular increase in average height in and since the last half of the nineteenth century; in 1841–5 the average height of conscripts 20 years old accepted for military service was 5 ft. 5½ in.; in 1906–10 it was nearly

5 ft. 7½ in. The same returns appear to indicate improvement not only in physical development but in health ; in the decade 1841-50, 36·4 per cent. of conscripts were rejected as unfit for military service, but the figures decreased regularly to 20·1 per cent. in 1901-10.

So far as it is possible to ascribe common characteristics to a civilized people, it may be said that Swedes are typically courteous and hospitable ; they are just, and markedly averse from litigiousness, courageous, and possessed (as their history proves) of soldierly qualities. At the same time they are humane, and are notoriously lovers of nature, a characteristic which, it is asserted, has averted them from psychological insight and made them poor judges of character, and is said to account for the facts that Sweden has produced eminent scientific men but few great diplomatists or merchants, and that she possesses a rich lyric literature but scarcely any dramatic. The Swedes possess a keen eye for foreign interests, movements, and methods.

In politics since 1866, when the method of representation was reformed, the class of peasant proprietors obtained a preponderating share of political power. This they have exercised themselves, not, as a rule, being represented by men chosen from other classes of the community. The electoral reform of 1909, however, has to some extent diminished their power. The labouring classes which till then possessed only insignificant representation in the Second Chamber of Parliament, have through the general franchise and the system of proportional representation obtained a full measure of representation there, and a considerable amount in the First Chamber. As the communal franchise has also been extended, the Swedish community has been largely democratized politically in recent years, and this has reacted powerfully on social conditions. The labour movement has been no less marked in Sweden than in other countries recently.

The number of people condemned for serious crimes was on an annual average 55·8 per 100,000 of the population in 1866-70 ; it fell to 36·5 in 1886-90, and stood at 49·1 in

1906-10. It has thus decreased on the whole since the middle of last century. In this respect, and in regard to social evils generally, the low though improving standard of Sweden has had one of its chief reasons in the national intemperance. A strong temperance movement, however, set in about the middle of last century ; in 1855 restrictive liquor laws were passed, and in 1865 the so-called Gothenburg system, providing for the municipal control of the sale of intoxicants, came into full operation. The average consumption of beer and spirits in Sweden is considerably lower than in Europe as a whole, though the effect of intoxicants is sometimes very apparent. Of spirituous liquors, *brännvin* is by far the most consumed.

The food of the people in the midlands and south is plentiful and good ; in the remoter parts of the north an unfavourable summer is followed by a winter of scarcity or even famine, and in these parts meat is little used. Rye is extensively employed, especially in the rural districts, for the making of a hard bread in flat cakes (*knäckebröd*). Of the whole bread consumed in the country, it is estimated that about 36 per cent. is wheaten, and 64 per cent. made of rye.

The character of the climate renders it necessary that dwellings should be built so as to secure warmth ; they are usually solidly constructed, with ample heating appliances, and commonly with double windows. As these requisites render the expense of construction relatively great, the number of rooms is generally restricted to a minimum. Apart from houses in large towns and occasional country residences of the better class, dwellings are principally of wood. Even in towns, it is only in the largest, and in those which have had to be rebuilt in recent years owing to partial or total destruction by fire, that stone or brick buildings predominate over those of wood.

The number of persons in Sweden who received relief in some form from the State in 1916 was 255,558. Of these, 32,546 were in Stockholm ; 10,221, in Göteborg ; 11,913, in Västernorrlands län ; 9,048, in Östergötlands län.

SWEDISH LANGUAGE

The Swedish language has developed as an individual tongue out of that which was common to Scandinavia about a thousand years ago. Its most typical characteristics, as compared with Norwegian and Danish, are the contraction of the old diphthongs, a profusion of unaccented vowel terminations, and a very peculiar accentuation. Many of the commonest words differ materially as between Swedish and Norwegian, both in pronunciation and in spelling, though the two languages are so far similar that they are as a rule mutually intelligible. Sweden has been divided into four dialect-regions—(a) the purest Swedish with its centre in Uppland, Stockholm, and the parts about Lake Mälaren, extending over Norrland (coastal districts) and including the East Swedish speech met with in Finland, &c. ; the dialects of the districts which border the Norwegian frontier more or less resemble the common speech of Norway in the north, and this is true in a modified degree in Värmland and Dalarne ; (b) the so-called Gothic speech of north and middle Götaland, around Lakes Vänern and Vättern ; (c) South Swedish, in the greater part of Småland, Skåne, Halland, and Blekinge, with close Danish affinities ; (d) the dialect of the island of Gotland, which is strongly distinctive.

RELIGION (SWEDEN)

In religion the Swedes are closely homogeneous, for the only non-Protestants are about 2,600 Roman Catholics and 4,400 Jews, and more than 99 per cent. of the population belong to the Swedish Lutheran Church. The King and ministers of State must profess the 'pure evangelical doctrine'. The law does not allow the introduction of orders of monks or nuns or the establishment of monasteries within the kingdom, and it takes no cognizance of negation of faith. All Swedish citizens must contribute to the financial support of the Swedish Church, though their contribution may be reduced if they also support another Church which is legally

recognized. The king acts as head of the church, through his Minister of Ecclesiastical Affairs. Persons under 18 years of age are not at liberty to withdraw from the established church.

Sweden is divided into 13 dioceses, and 188 deaneries. In the election of a bishop, three candidates are chosen by the chapter and clergy of the diocese; one of these three is appointed by the king. In the election of a priest, three candidates are chosen by the chapter; one of these, or in case of disagreement a fourth, is nominated by the vote of church members; and his appointment is referred to the government for confirmation. The Bishop of Uppsala has the title of Archbishop, and is president of the Convocation; but he is only *primus inter pares* with regard to the other bishops, whose superior is the king. Ecclesiastical legislation is effected by the decision of the Government, the Convocation, and (except in liturgical questions) the Riksdag. The bishop's authority is divided and shared by his chapter, which is generally composed of the dean of the cathedral city (that is, the rector of its chief parish), and the professors of theology in its university, or the majority of the principal teachers in its State secondary school. There is a right of appeal from the decision of bishop and chapter to higher courts of law, and to the government. The Vestry Meeting of the parish, presided over by the rector, elects the Vestry Board, which rules local affairs of the church, and administers its funds; and the School Board, which controls local education under the Ecclesiastical Department of the ministry. The rector of the parish is president of both boards. Clergymen are educated at the State universities of Uppsala and Lund. An old and disproportionate scheme of remuneration of the clergy was abolished in 1910, when tithes were done away with, and the State instead made an annual contribution to church funds; minimum stipends for rectors and for perpetual curates are fixed, but these are supplemented according to the area and population of the benefice. Rural parishes in the sparsely inhabited north are sometimes of very great extent; that of Jokkmokk in Norrbotten has an

area of nearly 6,800 square miles. The parish has still an intimate connexion with certain branches of secular life, such as registration and education. A scheme of training for laymen's work has been established on a German model; there is a training establishment for deacons at Stora Sköndal near Stockholm, and there are establishments for deaconesses at Ersta in Stockholm, at Uppsala, and at Härnösand. Young Men's and Young Women's Christian Associations are active, and other important bodies are the National Evangelic Union, which maintains the largest dépôt for religious books and has a training institute at Johannelund, and the Swedish Missionary Association, with a training school at Lidingö. The Salvation Army has about 4,200 officers and non-commissioned officers.

Apart from the Roman Catholics and Jews, the only religious bodies which, as Protestant, have legally seceded from the Swedish Church are the Methodists and the Catholic Apostolic (Irvingite) Church, and the numbers of their adherents is very small. The Swedenborgian community, though founded by a Swede, has only about 300 members in Sweden.

EDUCATION (SWEDEN)

Education is compulsory, parents and guardians being under the obligation of sending children to school when they are from seven to fourteen years old; if desired they may be sent at six years old. If a certain standard is not reached at the age of fourteen, obligatory education continues beyond that age; if the standard is reached earlier, there is an option of removing the child from school.

Public elementary schools, with State grants, are under the authority of the vestry meeting (each parish constituting a school district), except in certain towns where the municipal authorities control the schools. The higher authority is a central board for elementary schools. Some large parishes have travelling schools which work in different localities at different seasons. The obligatory subjects in elementary

schools are Scripture, reading, arithmetic, and geometry, geography, history, and simple natural history, including the structure, functions, and care of the human body. Drawing, singing, Swedish drill, gardening (where possible), sloyd (handicrafts), household economy, are among voluntary subjects, and these are carried forward in higher elementary and continuation schools.

Sweden, it may be observed here, has made two contributions to educational methods which have acquired importance in other countries: these are the system of gymnastics initiated by Ling and known as Swedish drill, and the sloyd system of instruction in handicrafts. For the latter there is a Sloyd Training College at Nääs which has received a substantial number of students from foreign countries, notably Great Britain, the United States of America, and Holland.

There are some fifteen State training colleges for elementary school teachers, two private training colleges for women, and about thirty State colleges for infant school teachers, of which two prepare teachers for work among the Lapps and Finnish-speaking people respectively.

The general effects of the State organization of education may be gathered from the fact that of conscripts called to the colours in 1913 only 0.11 per cent. were unable to read, and 0.22 per cent. were unable to write.

The State organization provides for bathing and instruction in swimming, free feeding of necessitous children, vacation colonies, and the care of deaf, dumb, blind, and mentally defective children, and has established reformatories.

State secondary schools, principally for boys, under a central board, are classified into two groups, *realskolor* or modern schools, and *högre allmänna läroverk*, comprising a *realskola* and a *gymnasium*, of which the latter is divided into two 'sides', the *realgymnasium* and the *latinogymnasium*. The system provides for pupils of ages from nine to nineteen. The aim of the *realskola* is to provide a general education of wider scope than that of the elementary school; that of the *gymnasium* is to prepare students for university education, and

the course terminates with the *student-examen*, the passing of which is necessary before entering a university, or admission as a military or naval cadet. There are about 38 secondary schools for boys comprising a *realskola* and *gymnasium*, and 39 independent *realskolor*, of which nearly half are co-educational. The normal subjects in the *gymnasium* are religion, Swedish, Latin, German, English, French, history, geography, elements of philosophy, mathematics, biology, physics, chemistry, and drawing, Latin being excluded from the *realgymnasium*, and chemistry from the *latingymnasium*. Secondary schools for girls are organized on somewhat similar lines, and there is a higher training college for women.

In order to bring about closer connexion between the State secondary and elementary schools, communal intermediate schools have been established chiefly in large communities (e.g. new industrial centres) which possess no State secondary schools.

Advanced scientific instruction in technical subjects is given at the Royal Technical High School at Stockholm and in the advanced department of Chalmers' Polytechnic College at Göteborg. This latter institution has also a lower department, similar to the State technical colleges at Malmö, Borås, Örebro, Norrköping, and Härnösand, and the technical school of Eskilstuna. Technical instruction is also given at about 80 lower technical trade schools in smaller towns.

Private schools, of whatever standard, are not numerous in Sweden.

The State universities are those of Uppsala and Lund, and the Karolinska Institut at Stockholm, though consisting only of a medical faculty, holds the same rank. At Uppsala and Lund there are four faculties: theology, law, medicine, and philosophy, which is divided into the two groups of *literae humaniores* and mathematics and science. Every student is obliged to belong to one of the unions called *nation* or *landskap* (province) according to the part of the country from which he comes. There are private universities at Stockholm and Göteborg.

THE PRESS

Norway.—Relatively to the small population of Norway, newspapers are numerous. In Kristiania several well-known and old-established journals are published. *Morgenbladet*, started in 1819, has played an important part in politics; in the middle of last century it became the organ of the government. *Aftenposten* was started as a representative conservative paper; *Vordens Gang* as a strong opposition journal of independent attitude. *Dagbladet* is a liberal organ; *Norske Intelligenssedler* is an independent paper and strong supporter of political and social reforms. *Social Demokraten* is the principal organ of the working classes. Among other daily newspapers in the capital *Morgenposten* and *Tidens Tegn* may be mentioned. Several newspapers are published in Trondhjem, and almost every town of importance, even in the far north, as at Tromsö, Vardö, and Hammerfest, has one or more small local papers; some of these, especially in smaller places, are published only twice or thrice weekly. The magazine press, on the other hand, is not extensive, but there are some technical journals of merit, such as the weekly *Teknisk Uleblad*, of Kristiania.

Telegraphic press communications are received mainly through the Norsk Telegrambureau, which obtains foreign matter (normally) for the most part through Ritzau's Bureau in Copenhagen.

Sweden.—In Sweden, again, the number of newspapers is large in proportion to the population, and their general standard is high. The leading moderate or conservative newspapers are *Stockholms Dagblad*, *Svenska Dagbladet*, *Nya Dagligt Allehanda*, all of Stockholm, and among provincial journals *Norrköpings Tidningar*, *Östgöta Correspondenten* (Linköping), *Sydsvenska Dagbladet* and *Skånska Aftonbladet* (Malmö), *Sundsvalls-Posten*, *Göteborgs Aftonblad*, *Göteborgs Morgonpost*, *Halland* (Halmstad), *Helsingborgs Dagblad*, *Kalmar Tidningen Barometern* (Kalmar), *Smålandsposten* (Växjö), *Borås Tidning*, *Uppsala*, and *Hernösandsposten*. *Afton-*

bladet and *Dagen*, of Stockholm, are intermediate between moderate and liberal principles. Liberal organs include *Dagens Nyheter* and *Stockholms Tidningen*, of Stockholm, *Göteborgs Handels- och Sjöfartstidning*, *Göteborgsposten*, *Skånska Dagbladet* (Malmö), *Bohuslaningen* (Uddevalla), *Vestmanlands Läns Tidning* (Västerås), *Öresunds Posten* (Hälsingborg), *Folkets Tidning* (Lund), *Östgöten* (Linköping), *Sundsvalls Tidning*, *Vesternorrlands Allehanda* (Härnösand), *Norbottens Kuriren* (Luleå). The Social Democratic party has an unusually large number of newspapers in its support, such as *Social-Demokraten* (Stockholm), and others in the chief provincial industrial centres. There are several political and general weekly and other periodicals, but, as in Norway, these are relatively less important than the daily press.

The Svenska Telegrambyrå works in co-operation with European press agencies for the supply of foreign news, and the Svenska Pressbyrå is an important distributing agency, controlling the distribution of Swedish and foreign papers on railways, steamers, &c.

EMIGRATION FROM THE SCANDINAVIAN PENINSULA

Emigration from Scandinavia has taken place from very early times. In the later Scandinavian settlements in the British islands, Danes were the principal settlers in England ; but Norwegians also settled in the north. Norwegians occupied the shores, and founded the towns, of Ireland, and took possession of the western and northern islands of Scotland, and of the northern Scottish counties, Caithness, Sutherland, and part of Ross. From Ireland, Norwegians settled in Westmorland, Cumberland, and Galloway, penetrating far into the south-west of Scotland ; they also entered Wales. In the east of Scotland there were Scandinavian settlements, but here probably the immigrants were partly Danish ; and the effects of the settlement resulted perhaps rather from prolonged peaceful infiltration than from warfare. In the Hebrides, Norwegian was spoken for centuries ; it was

supplanted by Gaelic, after the Hebrides were added to the Scottish kingdom in 1263.

In Orkney and Shetland, Norwegian was ultimately displaced by English, after they had become Scottish territory. Strong traces of the Norwegian language remain in the dialect of Shetland; the influence of Norwegian upon the Gaelic language is perceptible, from Ardnamurchan northwards; and probably some Scandinavian dialect has affected the pronunciation of English in Aberdeenshire. There is a considerable Norwegian element in the population of Great Britain; notably in the north and west of Scotland, where the conditions were not dissimilar to the conditions of life in the south-west of Norway, and favoured the survival of Norwegian types. Of the Norwegian settlements in the continent of Europe, the most important was their colony in Normandy (see further, Chap. V).

In recent times, the Scandinavian stock has dispersed still more widely. There are in the United States about 10 persons of Scandinavian birth in every 100 aliens, notwithstanding that the population of the Scandinavian countries is only about one-fortieth of the population of Europe. It is estimated that about 750,000 people emigrated from Norway between the years 1836 and 1914. As a rule (in 1896-1909) over 60 per cent. of the emigrants were men; over 44 per cent. were men between 15 and 30 years of age; over 7 per cent. were women between 30 and 59 years. In 1908 there was an almost equal number of male and female emigrants. From Sweden, between 1851 and 1914, emigrants numbered 584,259 men and 424,566 women. The annual number from each country fluctuates greatly.

By far the greater number (in 1896-1909, 94½ per cent.) of Norwegian emigrants have gone to the United States. About one-twentieth as many have gone to Canada; and a small number have gone to other American countries, to Africa, and to Australia. Similarly from Sweden, the United States received 80 per cent. of the emigrants during 1851-1900. Only a very small percentage (about six) returns from that

country. It is estimated that there are about 1,500,000 Swedes, or Americans born of Swedish parentage, in North America, 350,000 in Finland, and rather more than 100,000 in other European countries excluding Sweden, of whom 39,000 live in Norway and about the same number in Denmark.

The majority (in 1896-1909, 67½ per cent.) of Norwegian emigrants goes from rural districts. In 1910, of the foreign-born Norwegian immigrants to the United States, 57·8 per cent. lived in rural districts ; but 60·6 per cent. of the foreign Swedish population lived in towns.

In 1910, there were in the United States 403,877 persons of Norwegian birth (3 per cent. of the entire foreign-born white population). Of these, 230,156 were males (nearly 4 in 7). There were at the same time 665,207 persons of Swedish birth (4·9 per cent. of the foreign-born white population). Of these, 369,953 were males (over 5 in 9).

In addition there were 575,241 persons one at least of whose parents was of Norwegian birth ; 699,032 persons, one at least of whose parents was of Swedish birth.

They live principally in the following divisions of the States. The percentages are (1) of the whole element of foreigners, by birth, in 1910 (and, within brackets, in 1900) ; and (2) of the whole population, in the various divisions, in 1910.

	<i>Norwegians by birth.</i>		<i>Swedes by birth.</i>	
	(1)	(2)	(1)	(2)
New England	—	—	3·9 (4·1)	1·08
E. North Central	3·2 (3·8)	·5	5·8 (6·5)	·9
W. North Central	12·3 (12·1)	1·7	13·2 (13·6)	1·8
Mountain	3·3 (2·8)	·5	7·8 (9·5)	1·3
Pacific	4·7 (3·3)	·9	7·2 (5·8)	1·4

The Norwegians and Swedes were distributed thus among the divisions of the States, in 1910 :

	<i>Of 100 Norwegians.</i>		<i>Of 100 Swedes.</i>	
	<i>By birth.</i>	<i>By parentage.</i>	<i>By birth.</i>	<i>By parentage.</i>
New England	2·1	1·4	10·6	9·3
Mid-Atlantic	8·1	5·1	13·2	11·7
E. North Central	24·6	25·1	26·8	26·8
W. North Central	49·2	55·5	32·1	36·1
Mountain	3·7	3·3	5·3	5·4
Pacific	11·2	8·5	10·3	8·9

N. AND S.

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The following States have a Norwegian or Swedish settlement of over 20,000 :

	<i>Norwegians.</i>	<i>Swedes.</i>
Massachusetts	—	39,562
New York	—	53,705
Pennsylvania	—	23,467
Illinois	32,913	115,424
Michigan	—	26,374
Wisconsin	57,000	25,739
Minnesota	105,303	122,428
Iowa	21,924	26,743
Nebraska	—	23,219
N. Dakota	45,937	—
S. Dakota	20,918	—
Washington	28,368	32,199
California	—	26,212

The densest Norwegian rural settlements are in Lake Park Region, Minnesota ; in the district of La Crosse and Eau Claire in the west of Wisconsin ; and in a tract upon the boundary between Iowa and Minnesota.

In Minneapolis, the largest foreign element is Swedish. Swedes number 30·8 per cent. of the foreign-born population of that city ; Norwegians number 19·1 per cent.

The following cities of more than 25,000 inhabitants have over 5,000 residents born in Norway or Sweden :

1910.	<i>Norwegians.</i>	<i>Swedes.</i>	<i>Total Population.</i>
New York, N.Y.	22,281	34,952	4,766,883
Chicago, Ill.	24,186	63,035	2,185,283
Boston, Mass	1,914	7,123	670,585
San Francisco Cal.	3,769	6,970	416,912
Minneapolis, Minn.	16,402	26,478	301,408
Seattle, Wash.	7,193	8,677	237,194
St. Paul, Minn.	4,063	11,335	214,744
Denver, Colo.	617	4,537	213,381
Portland, Oreg.	2,726	4,801	207,214
Worcester, Mass.	358	8,036	145,986
Spokane, Wash.	1,874	3,344	104,402
Tacoma, Wash.	3,906	3,183	83,743
Duluth, Minn.	5,009	7,281	78,466
Rockford, Ill.	295	8,918	45,401
Superior, Wis.	2,488	3,056	40,384
Jamestown, N.Y.	42	6,929	31,297

There were 107,535 Scandinavians in Canada in 1911; nearly $1\frac{1}{2}$ per cent. of the population. In 1901 there were only 31,042, little more than $\frac{1}{2}$ per cent.

The principal areas of their settlement are :

	1911.	Norwegians.	Swedes.
Alberta		5,761	6,345
British Columbia		3,732	7,118
Saskatchewan		7,625	6,209

The volume of emigration has been viewed with much concern, especially that from Sweden, where it leaves an abnormal proportion of old people and children—in 1910 the excess above the normal of persons over 65 years old was 155,000. On the other hand, there was a deficit below the normal of 120,000 persons between the ages of 20 and 50. Exhaustive official investigations of the whole question have been made in recent years, and in 1907, with the assistance of the State, county councils, agricultural societies, and communes, a National Association against Emigration was established. This organization seeks to propagate, especially among the rural classes which have been most seriously affected by emigration, a fuller understanding of opportunities and means of livelihood in Sweden as compared with those in America, and to counteract exaggerated ideas of the possibilities offered by emigration. This is done by means of lectures, pamphlets, articles in the press, and the issue of a quarterly magazine and other publications. Moreover, the association works information bureaux and labour exchanges, and establishes or collaborates with land companies formed for the purchase of land and its division into small holdings, and it pays close attention to housing and other industrial problems.

THE LAPPS

The Lapp race was estimated in 1900 and 1914 to number about 34,000 persons, of whom about 21,000 were in Norway. The Lapps in Sweden numbered 7,114 in 1910. They form ethnologically, linguistically, and culturally a people apart.

They are generally accounted to belong to the Mongol or Mongoloid race. They are rather small in stature, having an average height of about 4 ft. 11 in. in the case of men, and 4 ft. 9 in. in that of women. The height of Lapp men in Norway is given as about 4 ft. 11 in. to 5 ft. 3 in. The Norwegian Lapps are more short-headed than the Lapps of Finland. They have abundant straight hair, thin beards, and broad faces, with very prominent cheek-bones. The complexion is brownish, and the eyes are brown, and only slightly oblique. They are frequently bow-legged, and consequently of unsteady gait; but they are enduring walkers. The muscles are well developed, and the hard life of this people is well borne. According to their standard they are intelligent and teachable; they are good-natured, though still inclined to be suspicious of foreigners. They are temperate, though temperance is enforced, and alcoholic liquor may have an extremely bad effect on them.

They are of Asiatic origin, and acquire but little of European civilization. Cloth has partly superseded skins in the material of their tents, and of their dress, which is modelled upon a type worn in their adopted country long ago. Their art is imitative, not original; they have no musical instruments, and but ill-developed poetry. They are said to have no old traditions, although there is among them some recollection of their former heathen religion. They are now Christians, and of a religious temperament, with many superstitions. They believe in the existence of trolls, and hold the bear to be a more or less sacred animal.

They live in tents, and (especially in their more southerly districts, and where they have fixed habitations) in turf-huts of similar shape. Sometimes the same hut shelters both men and animals.

They were originally nomadic hunters and fishers. To these occupations was added at an early date the domestication of reindeer. Reindeer are still essential to their nomadic life; and their existence has been ordered by and adapted to the needs of reindeer-keeping. Formerly reindeer could

supply all their wants, in food, clothing, and implements. The Lapps now purchase manufactured goods, including utensils that are peculiar to their use ; but everything they need for the management of reindeer is made by themselves.

They have from the earliest times kept dogs of a hardy and intelligent breed. These dogs are of great value to them in keeping their herds.

The language of the Lapps belongs to the Finno-Ugrian group. It is supposed that their original tongue was, through long association with the Finns, superseded by old Finnish, from which the Lapp language and modern Finnish are derived. The Lapps are not closely related ethnologically with the Finns. They have no written literature by which uniformity of speech might be preserved. Their language is divided into dialects, of Russia, Finland, Sweden, and Norway. These main branches are again split up into sub-dialects.

The position of the nomadic Lapps in respect to the international frontiers has caused difficulty from time to time. In their regular summer migrations, they crossed the frontiers of the various countries in which they lived ; many passed over to the west coast of northern Norway. These migrations caused international difficulties, and have been the subject of much discussion and dispute. They are now regulated by law ; and the Russian frontiers have been closed to Lapps. The establishment of Norwegian independence has created a new frontier problem. The Lapps claim a right to the desert lands between Norway and Sweden, for the feeding of reindeer. Reindeer pastures have been assigned to them by law. Provision has been made to maintain these rights in the event of war. In February 1917 Norwegian and Swedish Lapps held a three-days' congress, in order to protest against the laws that inflict penalties upon them for injuries done by trespassing, and to appeal for a reservation of their pasture privileges.

On the more habitable fringes of the territory over which they roam, the Lapps tend to settle in more fixed habitation. In these places also they are less pure in race. In Norway,

especially outside of Finmark, they are no longer an unmixed stock.

The nomadic Lapps that visit the counties of Tromsö and Nordland in the summer come principally from Sweden; they return in the autumn. These visitors are frequently educated, and sometimes prosperous. The Norwegian Lapps in those counties are mostly of fixed habitation. Settlements of Lapps are found as far south as Helgeland in Nordland. Stone-age relics of these peoples have been found as far south as Samdal. Their gradual southward movement was extended in the last decade of the nineteenth century, but has again slightly receded. Now few Lapps are found south of Telemark.

In the years of the nineteenth century's close, and the beginning of the twentieth, Lapps from Sweden migrated permanently to Norway, confusing the rights to reindeer-pastures.

The Lapps of Norway are divided into two groups: the Mountain Lapps and the Sea Lapps. The latter have learned boat-craft from the Norwegians, and live principally by fishing. They are less true to the ancient type of life, and more mixed in race, than the Mountain Lapps.

In Tromsö amt, Lapps are now called up for military service.

In Sweden, the Lapps have spread slowly southward from their principal locality in Norrbotten, where they number some 4,300; in Västerbotten there are about 1,800, and in Jämtland, Härjedal, and Dalarne about 1,000. About 3,650 are nomads. They are divided into Mountain Lapps, who make regular migrations between the forest and the mountain regions, and sometimes go down to the Norwegian coast, and Forest Lapps, who keep with their herds to particular districts in Norrland. Their domestic economy depends primarily on the reindeer, which supplies them with food, transport, and materials for clothing and other purposes. The Fisher Lapps are a poorer class, who have no reindeer, and subsist mainly on fishing.

The Swedish Government has done much for the civilization and protection of the Lapps, especially in the direction of establishing schools and churches. Taxes, for which each Lapp settlement is collectively responsible, are paid in money. The Lapps are exempt from military service under peace conditions, although of recent years the question of conscription in the form of a regular scout service has been discussed.

CHAPTER V

HISTORY

Early history—The Viking Age—Introduction of Christianity—Eleventh to thirteenth centuries—The Hanseatic League—The Union of Kalmar—Christian II—Gustavus Vasa—The Reformation—Subjugation of Norway by Denmark—The Swedish trans-Baltic dominions—Gustavus Adolphus and Axel Oxenstjerna: the Thirty Years' War—Christina and Charles X—Charles XI—Charles XII: the Great Northern War—The Hats and Caps—Russia and Napoleon—Bernadotte—Modern union of Sweden and Norway—Dissolution of the union.

EARLY HISTORY

THE Scandinavian peninsula is not by its physical character adapted to political unity. Its natural features, including great expanses of forest at the lower levels and uninhabitable highlands above, oppose many barriers, not wholly overcome even by modern methods of communication, to interrelation between the areas best fitted for human settlement. Therefore when the inhabitants of the peninsula begin to emerge from myth into history, they are found to be divided into tribes or clans, great or small, now in some instances temporarily united under a common leader, and again disunited, not only under the influence of the physical conditions already indicated, but also in accordance with the common practice by which early Teutonic rulers left their realms to be divided among their sons.

In the face of the natural barriers of mountain and forest the importance of the waterways—the straits at the mouth of the Baltic, the great lakes of southern Sweden, and the fjords and calm channels within the islands of the Norwegian and (in a lesser degree) the Swedish coast—becomes evident at a very early date. Thus there are references from about the first to the seventh century of the Christian era to the

two tribes in what is now southern Sweden, of outstanding strength among others, the Svear or Swedes and the Götar or Goths. The Svear inhabited the region round Lake Mälaren (at the eastern end of which Stockholm now stands), and the Göta, the belt across the southern peninsula which includes Lakes Vänern and Vättern. The Swedish coastlands of the Kattegat, however, were held, not by tribes whose headquarters were in the peninsula, but by the Danes, who, controlling the lines of water-communication across this narrow strait, maintained their hold down to the seventeenth century on what are now the Swedish as well as the Danish shores.

Norway, again, is found in the earliest historical period to be settled in quite a large number of independent districts or *fylke*, established wherever a small open waterside area offered the opportunity to farm, fish, and hunt; and when first any attempt at unification between these little territories appears it does so where the natural conditions lent themselves most easily to the process—as in the comparatively open and easy country at the west side of Kristianiafjord, and on Trondhjemsfjord, with their sheltered waters inviting communication. Harald Haarfager (Fair-hair), who reigned from 864 to 934, having become a local king at the age of ten, united all the settled parts of Norway under his rule, operating from that district which is their natural administrative centre—the district about Kristianiafjord, from which there is comparatively easy land-connexion northward through the dales to Trondhjem, and a seaway, in great part sheltered all round the coast, to the western districts. Harald introduced the principles of unity without its practices: before his death he appointed his favourite son Erik Blodöks (bloody-axe) to succeed him, but only as over-king over a large number of other sons, each of whom was given a kingdom of his own.

The discord resulting from this system persisted long in Norway; there seems to be less evidence of it in Sweden, which is claimed by some writers to have been united under one king as early as A. D. 700, and therefore to be the oldest

existing European state. A predisposing cause of unity was the existence of a central stronghold of the pagan gods at Uppsala, a little north of Lake Mälaren, the fame of which extended even beyond the borders of Sweden. It is not within the scope of this notice to deal at length with the scanty history and rich tradition of Sweden and Norway in early times, as preserved in the sagas and other literature, but some reference is due to the relations of the Scandinavian peoples with Europe at large during this period.

THE VIKING AGE

These relations were established by the sea-rovers, pirates, or colonists, best known under the general name of the Vikings, whose first recorded appearances are upon the coast of Dorset in 789 and at Lindisfarne in 793, though Northmen had no doubt crossed the North Sea much earlier. Danes, Norwegians, and Swedes (to use the modern terms) took part in these, and the political and social reasons which influenced them all alike are unknown in detail, but at least the geographical conditions favouring their movement are clear enough. They were accustomed, as has been seen, to make use of their huge system of natural waterways, whose sheltered waters gave them ample practice in navigation. The natural wealth of their own lands was not great, and after the limited activities of the winter it may be that the quick opening of the northern summer inspired them to go abroad. The movements of the Vikings have been shown to have proceeded, subject to circumstances, on a definite plan. Their first visits were usually short raids, made in summer, and having no apparent object other than pillage. Later they would winter in the strongholds they established, and in some instances spread thence far over the lands they had threatened. The ultimate phase of the Viking movement is the absorption of the Scandinavian settlers by the peoples in whose lands they settled, if they actually attained the stage of settlement, which they did not in every case. In addition to the British

Isles, they penetrated continental Europe by way of the Elbe to Hamburg, by way of the Scheldt to the middle districts of the Rhine and the Somme, by way of the Seine up to Paris and into Burgundy; the lower region of the Loire, the Garonne, northern Spain, the north-west African coast, the mouth of the Rhone, and even the Italian seaboard were visited by them. Such was the European range of the rovers who set out over the North Sea (it is not always possible to distinguish between those from Denmark and from Norway), but concurrently there was a movement from Sweden across the Baltic and far beyond. Though the statement is disputed, there appears to be no doubt that in the ninth century the relations between Sweden and the trans-Baltic lands became greatly strengthened, that Swedes (known as Varangians) pushed up the great rivers of Russia, and that they established themselves in territory in the district of Lake Ladoga and Novgorod (862), and found their way to the Black and Caspian Seas, to Byzantium, and to the region of the Caucasus. The foundation of the Russian Empire is dated from the settlement of the Novgorod territory by Rurik and the Rus (that is, the sea-warriors of the east coast of Sweden).

The Viking Age is usually taken as terminating about the time when King Charles the Simple ceded to the Northman, Rollo, in 911, the territory of the lower Seine (as we have seen, a favourite goal of the raiders) which became known as Normandy, the home of the Normans. The overseas voyages, however, did not cease abruptly, and they continued long after this date. Thus the expeditions across the northern seas to Iceland and Greenland belong mainly to the tenth century; the famous voyage which reached the North American coast at 'Vinland' (Nova Scotia or elsewhere) took place in the year 1000.

The effects of these voyages upon the social and political history of Scandinavia were profound. In them may be found the germ of the modern eminence of Norway in the mercantile marine of the world, or, again, of the distinguished part played by Scandinavians in exploration, especially in the polar

regions. But at and after the immediate period with which we have been dealing, the Northmen both taught and learned from those with whom they came in contact in their wanderings. When they settled, they sometimes showed (as in Normandy and in Russia) a capacity for government and, according to the lights of the times, for peaceful organization, which was less evident among the previous inhabitants of the settled countries. In certain methods of warfare and, above all, in shipbuilding and navigation they were the superiors of other Europeans.

The activities of the Vikings, however, sapped a good deal of strength from both Norway and Sweden. If they brought wealth into the countries, they did not distribute it equally, and in Norway especially the men who enriched themselves overseas did not as a rule leave their taste for warfare there. The period of some three centuries following the close of the Viking Age leaves a general impression of civil dissension and weakness on the one hand, and yet, on the other, of striving in various directions towards nationality and ordered government, including (for example) the codification of the laws of the different Swedish provinces into a single form. There also appears during this period the earliest movement towards the so-called union of kingdoms under one king, without any sort of national fusion, which, as will be seen, was subsequently attempted more than once in Scandinavia, but has never been justified by lasting success.

INTRODUCTION OF CHRISTIANITY

The external intercourse carried on by the Scandinavian peoples during and after the Viking Age hastened the introduction of Christianity into the north. It was brought to Sweden as early as 829, but took no root ; it was not established there until the reign of Olaf Skötkonung (about 993-1021) ; in Norway its apostle was the contemporary king Olaf Trygvesson (995-1000), but paganism struggled for many years after the death of these kings.

ELEVENTH TO THIRTEENTH CENTURIES

In Sweden King Sverker I in 1134 effected a union between the Svear and the Götar which at least paved the way for the firm establishment of undivided kingship in that country. Erik IX (1150–60) organized the Swedish Church, and conducted a crusade against the pagans of Finland, while Charles VII founded the archbishopric of Uppsala. In 1248–66 the country was under the strong administration of Earl Birger, the reputed founder of Stockholm, and an able legislator. For some time in Sweden, as elsewhere, a landowning aristocracy had been evolving itself out of the old class of wealthier peasants, but Birger arrested the consequent tendency towards serfdom, and King Magnus Ladulås about 1280 laid the foundations of a nobility based upon military service, and further regulated the relations between upper and lower classes (whence his second name, which signifies the lock of the barn, referring to his protection of the peasant against oppression).

Norway was on the whole less fortunate at this period. After the death in battle of King Olaf II in 1030, Norway was united to Denmark until his son Magnus I was crowned in 1035. There followed a sad period of civil discord, and from 1066 to 1161 the country was frequently divided between more than one king. Sigurd I, who died in 1160, was the last undoubted representative of Harald Haarfager's line, and to dissension between the ruling families was added that introduced by pretenders, until Haakon IV (1217–63) was strong enough to restore order. His son Magnus VI (1263–80), who, it may be mentioned, saw the uselessness of maintaining the Hebrides and the Isle of Man as appanages, and ceded them to Scotland, was a wise administrator, as appears from the name—Lagaböter, the law-mender—given him by the people.

HANSEATIC LEAGUE

Despite all opposing influences, the external trade of Sweden and Norway was developing at this time, and the towns were

growing in numbers and importance. With this development is correlated the extension to Scandinavia of the power of the Hanseatic League. This was a federation, in the first instance, of North German towns, formed to protect common commercial interests at a period of general unrest and aggression in north-central Europe. A natural step was the establishment of 'factories' or 'counters' in foreign towns for the German traders settled in them, and a further step was the gradual acquisition of rights of citizenship and local government by such settlers. These traders were early attracted to Scandinavia by its copper, iron, forest products and fisheries, and Scandinavia itself depended upon German exports for many necessities and luxuries. Lübeck became the most important German centre of this trade. The wide range of Hanseatic activities is shown by the fact that at Visby, the capital of the island of Gotland, long the chief Baltic entrepôt for trade between Russia and Sweden, German settlers possessed equal rights of citizenship with the natives as early as the beginning of the thirteenth century, while later (1343) they obtained special trading privileges in Bergen, their principal centre in Norway. These incursions were not an unmixed benefit to the Swedes and Norwegians, and they led to trouble later.

THE UNION OF KALMAR

There had been intermarriage between the royal houses of Norway and Sweden, and in 1319 the infant Magnus VII, who inherited the crown of Norway from his grandfather Haakon V, was elected King of Sweden, thus nominally uniting the kingdoms. He ceded the Norwegian crown to his son Haakon VI in 1343. In Sweden his rule continued longer, but was weak; in the course of it he attempted to buy by many favours the support of the aristocracy, and in 1359 he was compelled to call together the first Swedish *Riksdag* or national assembly. The lines of social history in Sweden and Norway are here diverging, for in Norway the aristocracy, through civil war, the usurpation of trade by foreigners, and the gradual extinction of serfdom, was becoming impoverished

and paralysed. The distinction thus drawn is important to the future history of the two countries. Norway, indeed, was now brought very low, for the Black Death hit the Scandinavian countries hard, about 1349-50, and the weaker country resisted the less strongly.

The Swedish aristocracy was powerful enough to depose Magnus in 1365, and elected Albrekt of Mecklenburg king, but found him no more suitable to their requirements, and presently looked for a successor. In 1363 Haakon VI of Norway, son of Magnus, had married Margaret, daughter of Valdemar IV, King of Denmark. Valdemar, dying in 1375, was succeeded by Margaret's young son Olaf, who also received the crown of Norway on the death of Haakon in 1380. Olaf died in 1387, and Margaret, who had acted as regent, continued to rule, having her grand-nephew, Erik of Pomerania, declared king in 1389. She was now invited to Sweden to dispose of King Albrekt, who had assumed the title of King of Norway and Denmark, but reckoned without the majority of his nominal subjects. He gave Margaret battle, and was defeated and deposed with ignominy. It took Margaret some years to overcome by force such opposition as she encountered in Sweden, but in 1397 she brought about a meeting of Swedish, Danish, and Norwegian representatives at Kalmar, which 'eternally' united the three kingdoms under one king. Erik was crowned; Margaret remained regent. This so-called Union of Kalmar provided for a community of interests in regard to defence and foreign relations, but for the governance of each country according to its own laws, while in each country only natives were to hold high office and own land.

The three kingdoms were indeed closely allied in language and customs, but their external interests lay in different directions, and their internal political tendencies were in various respects dissimilar; moreover, the difficulties of intercommunication remained a geographical obstacle to unity. All such difficulties might conceivably have been overcome, or at least counteracted, by able and upright statesmanship, but this was wanting. Denmark, the pre-

dominant partner in the union, made no attempt to maintain the rights of the other kingdoms, and some of the provisions of Kalmar, such as that reserving high offices for natives in each country, were made only to be broken. Margaret (herself not impeccable in this respect) died in 1412, and Erik, as a ruler, showed none of her ability. The Swedish peasantry rose against him in 1434-6 under the enlightened noble Engelbrekt, and this rising is claimed as the first evidence of a general popular conception of Swedish nationality. A period of chaos followed, during which the king set up by Sweden, Charles VIII, was alternately expelled and reinstated. In 1458 Christian I defeated the Swedes and reunited the three kingdoms, but renewed promises of free and equal government were again broken, and Sweden threw off his yoke at the battle of Brunkeberg (Stockholm) in 1471, which brought the country the unusual phenomenon of twenty-five years' peace. From this time until 1520 Sweden had as successive governors three members of the Sture family, who did much to foster the national spirit as against the priesthood and the higher nobility, who favoured the Union.

CHRISTIAN II

Christian II, who had been Governor of Norway, ascended the throne in 1513, but his rule was not accepted by Sweden. He was an able statesman, who conceived, and to some extent put into execution, domestic reforms of high value; he aimed at absolute monarchy in the three kingdoms, but he was obsessed by obstinacy and vengefulness, and never developed the full power required to drive through his own schemes. His opportunity appeared to have arrived when Sten Sture, the governor, and Gustavus Trolle, the new Archbishop of Uppsala, fell out, and the governor besieged the archbishop. Christian attempted to carry help to Trolle, but Sture and the peasantry succeeded in fending him off until 1520, when Sture died of a battle-wound. Even then his widow, Christina Gyllensterna, rallied the opposition, and did not surrender Stockholm till she had extorted a complete amnesty from the king. Trolle,

however, now restored to power, demanded the punishment of his enemies, and when Christina pointed out that the opposition to him had been sanctioned by a national assembly, which included several of the bishops, Trolle obtained Christian's connivance at a shameful massacre of a number of leaders in the popular movement. It is hardly necessary, therefore, to state that Christian did not leave Sweden pacified. His own domestic reforms subsequently raised the majority of his Danish subjects against him, and as ever since his period of governorship in Norway he had been an opponent of the assumption of excessive powers in local government abroad by the German traders of the Hanse, he had also that powerful league against him. In 1523 he left Denmark to seek help abroad (the Danes meanwhile setting up the Duke of Holstein as king under the title of Frederick I), and he did not reappear until 1531. In that year he landed in Norway as a champion of the church of Rome against Lutheranism (to which Frederick was a convert), but he made little impression there, and was stoutly opposed, on attempting to enter Sweden, by the peasantry under Gustavus Vasa. In 1532 Christian was compelled to surrender to Frederick's lieutenant, Gyldenstjerne, and was conveyed to Denmark and kept a prisoner till his death in 1559.

GUSTAVUS VASA

In 1518 Christian had carried off to Denmark certain hostages, among whom was the young Gustavus Vasa, who escaped. On returning to Sweden, Gustavus made for Dalarne or the Dales, the name given to that part of south-central Sweden which lies in the basin of the Dal river. Its peasant inhabitants were (and still are) a well-defined type, independent and strong both in body and in mind. Among them Gustavus gradually acquired predominating influence, and from their territory as a centre his influence spread. But the financial position and administrative organization of Sweden as a state were in no condition to enable her to fight unaided for her own independence, and Gustavus, forced

to seek help without, looked to the powerful Hanse cities of Lübeck and Danzig, which, in return for services rendered, claimed freedom from mercantile tolls and got practically the whole of Swedish trade into their hands. Gustavus, elected King of Sweden in 1523, found the claims of the Hanse a heavy burden; his efforts to collect money brought him into conflict with the peasantry who had set him on the throne; yet he ably overcame these and other difficulties during his long reign (1523–60). The end of the domination of Lübeck in Swedish commerce and affairs was brought about by the 'Count's War' of 1534–6, wherein it was sought to establish Count Christopher of Oldenburg as governor in Denmark for the deposed King Christian II, with the help of Lübeck. This effort was overcome by Christian III of Denmark, son of Frederick I, with the help of Gustavus. After this alliance, Gustavus, subordinating his personal distrust of Denmark to the interests of his kingdom, maintained peace with Denmark: with Russia he had a frontier dispute, resulting in a war of short duration in 1556; otherwise Sweden during his reign had little political relation with foreign states.

THE REFORMATION

The position in regard to ecclesiastical affairs was very different. Gustavus, who had forced the Church to give up many possessions to help the national exchequer, seized the political advantages offered by a rupture with Rome. To overcome the independence of the Church was essential to his scheme of government, and though the support of the peasantry for their Church drove Gustavus to threaten abdication, the threat alone was sufficient: he was implored not to leave his people. Thus the Reformation in Sweden was the work of one man; the authority of Rome was thrown off from political motives, and the change of doctrine and practice was left, so far as Gustavus was concerned, as a matter of secondary importance to a process of gradual evolution. This, however, was not the end of the religious controversy in Sweden. John III (1578–92) held middle

views between the extremes of Roman Catholicism and 'Luthery', and near the end of his reign, under the influence of the Catholic reaction in Europe, there was a movement towards the reunion of the Swedish Church with Rome. After his death, however, the Protestants adopted the Augsburg Confession without consulting Sigismund, the Catholic King of Poland, who now, as John's son, succeeded also to the Swedish crown. His uncle, Duke Charles of Sudermania, was the leader of the Swedish Protestants, and Sigismund took up arms against him, but was beaten at Stångåbro in 1598 and left Sweden to Protestantism and to the rule of an abler monarch, Charles IX (1599-1611), under which title the duke ascended the throne.

SUBJUGATION OF NORWAY BY DENMARK

Norway, at this period, at once suffers and (in some respects) benefits by her geographical position. She attempted to reject Christian III of Denmark as king, on the ground that the kingship was elective and that she had not been consulted; the attempt failed, and Christian thereupon abolished the council of regency (1537) and set up a viceroy and a chancellor (both Danes) in Norway; Norway thus became practically, though not nominally, a province of Denmark, but there was no opposition, and the explanation suggested is simply that the people, few and scattered in remote settlements, only gradually became acquainted with the new conditions. A similar phenomenon appears in connexion with the Reformation. We have seen that Christian II's attempt to raise Norway in his favour, as the crowned champion of Rome, failed; on the other hand Lutheranism spread over the country very gradually, without violent opposition, and for many years Roman practices were alternately discontinued and resumed according as the priests, perambulating their vast parishes, happened to be present or not. Norway, for a long period, now practically disappears from a summary history of the Scandinavian peninsula.

THE SWEDISH TRANS-BALTIC DOMINIONS

Inasmuch, therefore, as Sweden becomes the predominant figure, and as the period which follows witnessed important extensions of her frontiers, it is desirable to make clear that the kingdom of Gustavus Vasa was materially smaller than that of modern Sweden. We have seen that the command of water-communication was politically more important than that of communication by land ; for this reason Sweden had no coast-line on the Kattegat, the division or shire of Bohuslän, south of Kristianiafjord, being included in Norway, and those of Halland, Skåne and Blekinge belonging to Denmark, which thus possessed the extreme southern peninsula of modern Sweden, and the coastal slope from modern Göteborg south and east to a point opposite the southern extremity of Öland Island. Farther north, Härjedalen and Jämtland were reckoned to Norway, these divisions representing the territory on either side of the route now followed by the railway from Trondhjem eastward into Norway across a well-marked depression in the ' Keel '. To the north lie the rough forest country and deep valleys of Ångermanland, and the remote territory of Norrland can scarcely have possessed any great political significance, though it enters for a moment into history when Charles IX of Sweden took the title of King of the Lapps of Norrland, which afforded one reason for the declaration of war upon him by Christian IV of Denmark in 1611. Sweden held the island of Gotland (which, however, was ceded to Denmark in 1570) and a considerable, though ill-defined, territory on the Finnish side of the Baltic. And it was across the Baltic that Sweden, after the period of consolidation at home under Gustavus Vasa, was first led to territorial expansion. In 1558-60 the provinces of the order of the Teutonic knights were invaded by Russians, and Sweden entered the field against them. Acting alone, she had almost suffered defeat, but in 1576 Stephen Bathony, king of Poland, entered into alliance with the Swedes, and together they defeated the Russians (1578), after which

Sweden found herself possessed of a substantial oversea territory in Esthonia and neighbouring lands. She was committed to a militant foreign policy which, as will be seen, proved ultimately beyond her powers.

An immediate result of this policy was the establishment of a standing army, at the instigation of Charles IX. During his short reign the country was involved in war with Poland, Russia, and Denmark. From the first of these Esthonia was won. The famous Gustavus Adolphus, who became king in 1611, concluded an onerous peace with Denmark in 1613. In 1617 peace with Russia gave Sweden Kexholm and Ingria, and Russia renounced any claim upon Esthonia and Livonia. A further war with Poland followed in 1621-9; it was actually a struggle for the mastery of the southern Baltic coast-lands, though Gustavus Adolphus perhaps exaggerated its religious significance as a war (on his side) to protect Protestantism against Catholicism. It left Sweden, at the truce of Altmark, in 1629, with a six years' tenure of her conquests in Livonia, and the possession of the Vistula delta, Elbing, Braunsberg, Pillau, and Memel, with the right to levy lucrative tolls at other neighbouring ports.

GUSTAVUS ADOLPHUS AND AXEL OXENSTJERNA : THE THIRTY YEARS' WAR

Meanwhile, in 1618, the Thirty Years' War had broken out—a war primarily religious, to a part in which, therefore, Gustavus Adolphus, and the people whom he had inspired at once with religious and with military ardour, became inevitably committed. Not that religious considerations solely influenced the king. He also feared the possibility of a Catholic power strongly established on the southern Baltic coast, and threatening Swedish trade. In 1630 Gustavus moved his army across the Baltic to Peenemünde and Stettin. His first task was to negotiate alliances, and he succeeded, by the following year, in concluding treaties with the princes of Pomerania and Brandenburg, with France, and lastly with the shiftY Elector of Saxony. He was too late to avert

the siege and sack of Magdeburg, which had declared itself for Protestantism and besought his aid, but in September 1631 he met Tilly's army at Breitenfeld near Leipzig, and totally defeated it, and deciding, against the advice of his principal counsellors, to move south-west instead of dealing with Austria, he triumphantly entered Mainz at the end of the year. In 1632 he occupied and garrisoned Augsburg, Ulm, Munich, and other places ; but Wallenstein, called upon by the Emperor Ferdinand, raised a new army and faced Gustavus at Nuremberg. In the ensuing battle of Lützen (November 6, 1632) Gustavus Adolphus fell ; the Swedes avenged him, but not to the full, for they were too much exhausted to follow up their victory.

The position of Sweden might now have been far more precarious than it was, for Gustavus was succeeded by his daughter Christina a child of six. That the country maintained itself in its new position of a European Power was a personal triumph for the chancellor, Axel Oxenstjerna. Under his direction an Evangelical Union was formed in Germany in 1633, to maintain the army. A grave set-back to the Swedish arms occurred in 1634, when the Swedes under Bernhard were severely beaten by Wallenstein's successor, Gallas, at Nördlingen, and South Germany was lost. In 1636, however, a new treaty with and subsidy from France enabled Oxenstjerna to continue the struggle, and his gifted general Johan Banér, re-established Swedish power in the north, maintaining his hold on Pomerania against almost overwhelming odds. In 1641 Banér died, but his colleague Lennart Torstensson in 1642 won an important victory at Breitenfeld (the scene of Gustavus's triumph). The pursuit of this victory in the following year, however, was arrested.

Christian IV of Denmark had aroused the enmity of Sweden by denying freedom from tolls for passage through the Sound in the case of her new trans-Baltic possessions, and also by arresting the transport of munitions, which to Sweden, with her wealth in iron, formed an extremely important staple of trade at this time. War was declared on Christian in 1643 ;

Torstensson was diverted from his victorious career in central Europe, and swept through Jutland with extraordinary rapidity. Christian maintained himself in the islands, but by 1645 he was decisively beaten on land and sea, and by the peace concluded at Brömsebro in that year Sweden acquired the island of Gotland and Ösel to the east of it, the Norwegian shires of Jämtland and Härjedal, and that of Halland for thirty years.

The Thirty Years' War was now dying down ; negotiations for its ending were protracted, but in 1648 the Peace of Westphalia was signed. 'By this convention Sweden obtained (1) Upper Pomerania, with the islands of Rügen and Usedom, and a strip of Lower Pomerania on the right bank of the Oder, including the towns of Stettin, Garz, Damm, and Gollnow, and the isle of Wollin, with right of succession to the rest of Lower Pomerania in case of the extinction of the house of Brandenburg ; (2) the town of Wismar with the districts of Poel and Neukloster ; (3) the secularized bishoprics of Bremen and Verden ; and (4) 5,000,000 rix-dollars. The German possessions were to be held as fiefs of the Empire ; and in respect thereof Sweden was to have a vote in the Reichstag, and to 'direct' the Lower Saxon Circle alternately with Brandenburg. Full civil and religious liberty was, at the same time, conceded to the German Protestants. . . . France and Sweden moreover became joint guarantors of the treaty with the Emperor.' Sweden's material reward, proportionately to her sacrifices, was scanty, although her control of the mouths of the principal North German rivers, the Oder, Elbe, and Weser, was geographically important. But 'her vigorous intervention in the Thirty Years' War had saved the cause of religious liberty in Europe ; and this remains, to all time, her greatest historical exploit.'

CHRISTINA AND CHARLES X

The domestic condition and administration of Sweden was not neglected, in spite of their military preoccupations, by Gustavus Adolphus and Axel Oxenstjerna, and though the

Swedish wars, both before and after this point in their history, tended towards the impoverishment of the lower classes and the enrichment of the nobility, thereby laying the foundations of discord, the people remained willing to pay the price of warfare, though often showing their dismay at its magnitude. The upper classes in particular, and the people at large, had their outlook broadened in many directions through contact with other nations, and the eccentric genius of Queen Christina, Gustavus Adolphus's successor, encouraged science, literature, and the development of trade (especially the iron industry of the Dales). But extravagance and other less material faults embittered her people against her, and after she had abdicated in favour of her cousin Charles X in 1654, Sweden was saddled with a ruler who, with all his high qualities, was too ready to commit his country to further adventures overseas. He declared war on Poland, a disrupted state, in 1655, with the ostensible object of forestalling a Russian advance to the Baltic provinces. Successful at first, he was checked before the monastic fortress of Czechstokova, and Poland rallied. Charles's generalship was extraordinarily able, but his political ill-fortune counteracted it. In 1657 Denmark, with an eye upon her lost provinces, declared war upon him, and Charles, withdrawing from Poland, hurled his forces upon Jutland as Torstennson had before him. In December 1657, an abnormal frost enabled Charles to invade the islands of Fünen and Laaland by crossing the straits over the ice. In 1658 Denmark sued for peace. The districts of Bohuslän, Halland, Skåne, Blekinge, and Trondhjem, and the island of Bornholm, were ceded to Sweden, but this was not enough, and Charles, without justification, reopened hostilities and besieged Copenhagen. But now he brought new enemies upon himself. Copenhagen was relieved by the Dutch: Poland, Brandenburg, and Russia became involved against Sweden. Trondhjem and Bornholm were lost, together with parts of the trans-Baltic dominions. The most important geographical result of these wars was that Denmark was permanently excluded from the opposite shores of the Kattegat and the Baltic, which from now remained Swedish.

CHARLES XI

When Charles X died in 1660, Charles XI was only four years old, and the regency had no adequate successor to Axel Oxenstjerna (who died in 1654) to guide it. The regency made peace, but was unhappy in its foreign relations. In 1672 a kind of retaining fee was accepted from France, in return for a promise of military support, and when France called on the Swedes to invade Brandenburg, the result was disastrous to their arms. It was only due to the military ability of Charles XI, when he assumed power, and to the strength of France, coupled with her determination to maintain for her own ends the strength of her northern ally, that in 1678 Sweden's continental possessions were for the most part confirmed to her. The reign of Charles XI (1660-97) was also noted for changes in internal government and administration. The people were prepared, by the brilliant position taken by their monarchs as military leaders, for the acceptance of the doctrine of royal absolution; that doctrine also promised an offset to the oppression of the lower classes by the nobility, and in 1680 and following years the Riksdag assented to the assumption of sovereign rights by the king, although it remained as a consultative body representing the people. Moreover, in face of the opposition of the nobility, Charles occupied himself successfully with the recovery of the Crown lands which had been alienated in favour of the nobles by way of fiefs in return for services rendered. He also introduced important reforms in the army and navy, including the establishment, in a far more favourable geographical position than Stockholm, of a new and powerful arsenal at Karlskrona.

Charles XI was succeeded by his more famous son Charles XII (1697-1718).

CHARLES XII: THE GREAT NORTHERN WAR

The forfeiture of the alienated Crown lands (*reduktion*, as it was called) led indirectly to the Great Northern War into

which Sweden was plunged in 1699–1720. A noble, Johan Patkul, who fled into exile to escape the consequences of a too vigorous protest against the *reduktion*, set in train the coalition between Poland, Denmark and Russia, with which were associated later England, Hanover, Prussia, and Saxony, which kept Charles XII out of his kingdom till 1714, and brought it, during that time, to a condition of much suffering and unrest. Charles is blamed for aiming at avenging himself upon his enemies rather than taking the opportunities which offered for an honourable settlement in the course of his brilliant campaigns; thus, in 1699 he invaded Denmark and forced terms upon her, but turned to attack Russia through Livonia; victorious there, he turned again to attack Poland, and occupied both Warsaw and Cracow; but by 1708 his opponents were too many for him, and in the hard winter of that year his army suffered almost beyond endurance. In 1709 he was heavily defeated near Pultova, and fled to Turkish territory; his diplomatic effort to obtain Turkish help against Russia met with no lasting success, and in 1714 he returned to Sweden almost alone. In 1716 he was defending his own shores, and in 1717 and 1718 he invaded Norway in order to conquer territory on the basis of which he might negotiate with his enemies: on the second of these expeditions he was killed. Peace followed in 1719–21, and Sweden was left with only a shadow of her trans-Baltic empire.

THE HATS AND CAPS

When the sovereign powers of the king were such that he could at will involve the country in wars such as Sweden had endured for nearly a quarter of a century, it was not unnatural that these powers should be viewed with alarm, and the pendulum swung back to the extreme limitation of the monarchy under the new constitution of 1720. But by this means the conflicting interests of the four states in the Riksdag—the nobles, priests, burgesses, and peasants—were thrown into stronger relief. Moreover, during the peace which

followed the Great Northern War Sweden rapidly recovered, and presently there emerged a strong body of opinion which scorned the pacific tendencies of the older statesmen, who were nicknamed the 'night-caps' or Caps. The party which held the more aggressive views were called the Hats from the common headdress of the officers and others of the upper classes who belonged to it. The Hats, being gifted with the greater political adroitness, maintained themselves in power until 1765 in spite of their faults. Aiming at the restoration of the country to the position of a first-class power, they adhered to the French alliance on the ground that it assured their objects; they entered upon a war with Russia and were within an ace of losing Finland; they also joined in the Seven Years' War with lamentable results. Their financial methods were extravagant, and when the Caps ousted them there was plenty of work to do in the direction of internal reform. The Caps were anti-French and pro-Russian, and Sweden had fallen by no means so low that her friendship had ceased to be sought for, but Russia was a dangerous ally for her, having an eye always to her extinction as a rival in the Baltic arena. The Caps carried with them popular sentiment among the lower classes, and the controversy with the Hats was rapidly turning in the direction of class-warfare, when King Gustavus III entered the lists with the *coup d'état* of 1772, which imposed upon the estates, by a show of force which wholly overawed them, a new constitution which converted a disunited state, with a figure-head king, into a strong, though still limited, monarchy. But Gustavus took a step too far when by another *coup* in 1789 he seized the absolute control of foreign affairs and of the army, and the irreconcilable anger of the nobility against him on account of this measure led to his assassination in 1792.

RUSSIA AND NAPOLEON

The policy of Gustavus III towards Russia was at first that of the soft answer, but the tone of the Empress Catherine II towards him was such that war could not be avoided. Com-

selling the Swedish aristocracy to promise him assistance, Gustavus declared war, and must have conquered, had not his officers engineered a mutiny in his army, claiming (not without reason) that the king acted unconstitutionally in making war. At Russia's instigation, however, the Danes now invaded Sweden, which gave Gustavus the opportunity to return thither, rally the Dalesmen to his standard, and relieve Göteborg, on which the Danish blow had fallen. Gustavus had behind him the powerful moral support of Britain and Prussia, and the Danes quickly evacuated Sweden. After the *coup d'état* of 1789, already mentioned, Gustavus carried out another campaign against Russia, this time successful, which resulted (1790) in the confirmation of Swedish dominion in Finland, according to the terms of previous treaties.

These favourable conditions were thrown away during a short but disastrous period of regency after the assassination of Gustavus III, and the equally disastrous period of rule by his successor. Many of the ablest supporters of the Gustavian régime were driven out of power by the duke-regent and his satellite, G. A. Reuterholm, a strong anti-Gustavian and ally of revolutionary France. Gustavus IV, on taking up power, passed to the other extreme; he was a rabid hater of France and of Napoleon, against whom he threw forces into the field without possessing any ideas as to how they might be successfully employed, and finally, under his arch-enemy's instigation, he found himself faced by both Russia and Denmark. He was forced to abdicate in 1809, and the duke-regent became king as Charles XIII. But it was too late: Russian forces had penetrated deeply into northern Sweden, and peace was only secured by the cession of Finland and the Åland Islands. Peace was concluded in the same year with Denmark, and in 1810 with France. Pomerania was returned to Sweden in consideration of her closing her ports against British goods.

BERNADOTTE

Charles XIII was infirm and childless, and the question of his successor raised grave issues. Charles Augustus of Augustenburg was elected Crown Prince against violent Gustavian opposition. Shortly after his arrival in Sweden he died suddenly. The suggestion of foul play, false as it might be, was obvious. The earl-marshal, Count Fersen, a leading Gustavian, fell a victim to mob violence. But by degrees, as public feeling quietened, it settled in favour of a soldier heir to the throne, and in 1810 Bernadotte, prince of Ponte Corro, one of Napoleon's marshals, was offered and accepted the position of Crown Prince under the name of Charles John. He at once became king in all but title, for Charles XIII was too ill to wield much power. Charles John made no effort to regain Finland; on the other hand he conceived the project of conquering Norway. Not without difficulty he obtained the countenance of Britain and Russia, Denmark (rather of necessity than of will) still holding to France. In 1814, by the peace of Kiel, Denmark surrendered Norway in return for Swedish Pomerania and Rügen, and an indemnity. The kingdom of Sweden was now at last defined within the limits of the peninsula, and its oversea dominion, which had never possessed any geographical or ethnological unity, ceased to exist.

In 1818 Charles XIII died, and Charles John ascended the throne of the two kingdoms of Sweden and Norway. Scandinavia now ceases to take any important place in European political history at large. Its principal events during the succeeding century are concerned with the disputes which arose out of the union between the two kingdoms.

MODERN UNION OF SWEDEN AND NORWAY

The Norwegians not unnaturally objected to their transference, in 1814, from Danish to Swedish domination, as to which they had not been consulted. A meeting at Eidsvold

drew up an independent constitution, and elected the Danish Governor, Prince Charles Frederick, as king. Charles John invaded Norway, but after little more than a demonstration of hostilities a convention was signed. Charles John promised recognition of the Eidsvold constitution subject to an amendment necessitated by the union of the kingdoms, Charles Frederick abdicated, and Norway was declared 'a free, independent, indivisible, and inalienable kingdom, united with Sweden under one king', under the Act of Union (*Rigsakt*) of August 6, 1815.

The union thus consummated, which was maintained from 1815 to 1905, was purely personal in the sense that the king was the sole link in the chain. His rights and powers were defined by separate constitutions, one for each state, which materially differed. The two states had separate, and again materially different, systems of government, separate military forces, financial systems and tariffs (there was, indeed, a tariff-boundary between the two), coinages, codes of law, &c. The economic interests and political outlooks of the two countries were widely diverse, and in some respects antagonistic. 'In Sweden the tone of the political system, until far in the nineteenth century, was distinctly autocratic, and that of the social system aristocratic; in Norway the principle that preponderated was rather that of democracy.' Not even the exact nature of the union was agreed upon. Norway considered that the two states, as such, were intended to be on a footing of complete equality; Sweden denied this, claiming that Norway was, at the outset, no more than a ceded territory, to which autonomy was granted as an act of grace; she was, moreover, the less wealthy and less populous member of the union. And though, when the history of the union came to be reviewed about the time of its dissolution, Sweden was able to claim that she had always been willing to treat the disputes between the kingdoms in a spirit of concession, the Norwegian reply was simply that Sweden was in no position to make concessions: that the term was inapplicable in respect of transactions between two states of equal standing.

and further, that the majority of the disputes concerned matters which properly were at issue only between Norway and the King of Norway, not between Norway and the King of Sweden and his subjects. Such an argument goes to show the inherent impracticability of the union.

The fact that the union provided only for one foreign minister was the earliest source of dissension, for in 1821 Charles John aroused strong feeling by inquiring through the foreign ministry how the Powers would view his use of force against Norway to compel a revision of the constitution. Nothing came of this : indeed, it is a feature of the whole period of the union that revolutionary changes proposed from the Swedish side came habitually to nothing. Thus in 1860, following upon a Norwegian proposal to abrogate the king's right to appoint a viceroy (an office which was actually abolished in 1873), Sweden took up the question warmly, and a complete revision of the union was brought forward, in which Swedish supremacy would have been definitely recognized. Even a common parliament was contemplated in which Swedish membership was to preponderate on a population basis. None of these proposals was given effect. After the accession of Oscar II (1872-1907), who proved to be a skilful keeper of the peace, the situation was for a while less strained. Frederick Stang, for many years leader of the Conservative party in Norway, had also done much to rectify relations between the two states. But in 1880 he resigned, and the Liberals became increasingly powerful. In 1883 the king gave way over a controversy, into which a powerful body of adverse Swedish opinion had thrust itself, over the Norwegian desire that the minister and councillors of state should have the right of access to the *Storting* (the Norwegian parliament) and of participation in its debates ; this practice connoted the establishment of the principle of ministerial responsibility in Norway.

As the economic position of Norway grew stronger, and her foreign relations more extensive, on the basis of her important and increasing mercantile marine, new points of dissension

emerged and old points were revived. The creation of a 'pure' Norwegian flag, excluding the symbol of the union, was disputed for more than twenty years before the king allowed it in 1899. The participation of Norway in the management of diplomatic and consular affairs again became an acute question. More than one honest attempt was made to settle it, but all came to a deadlock, Norway claiming as a right what Sweden would only concede under guarantees. The position stood (since 1835) that the Norwegian minister in attendance at Stockholm should be present when the (Swedish) foreign minister was doing business with the king. There was no Norwegian foreign minister. In 1885 Sweden made changes in the administration of foreign affairs which appeared to the Norwegians to place their representative in a weaker position: Sweden offered to rectify this, but demanded in return such guarantees as a common budget for foreign affairs and the maintenance of the Norwegian army and navy at a certain standard. As for the consular service, its control had been vested in the foreign ministry in 1858. Norway claimed that whereas she had formerly employed as consuls the persons who represented Sweden, as a matter of convenience, the divergent economic policies of the two states, and the condition of competition between them in certain branches of trade, demanded that separate services should be set up.

In 1892, and again in 1898, these questions brought the two states to the verge of war. In 1902, however, a joint commission laid down the practicability of two entirely separate consular systems, and in 1903 an official *communiqué* announced an agreement under which two essentially identical codes of administration were to be worked out for the two systems. But disagreement supervened, and negotiations finally broke down upon the demand by Sweden that the Swedish foreign minister should be able to dismiss a Norwegian consul.

DISSOLUTION OF THE UNION

In May 1905 a new measure for the creation of an independent Norwegian consular service was passed by the Storting and vetoed by the king. The ministry resigned; the king refused to accept their resignation and form another government. The Storting now claimed that the Crown had failed to exercise its constitutional function, that Oscar II thereupon ceased to be King of Norway, and that the union with Sweden was thus dissolved (June 1905). Sweden demanded an explicit popular expression of desire for the dissolution. She got that for which she asked, for the Norwegians, by a referendum, confirmed the action of the Storting by 368,211 votes to 184. A treaty concluded at Karlstad (September 1905) defined the terms of the separation, and included the following provisions. Any future disputes between the two states which cannot be settled by direct diplomatic negotiation are to be referred to the permanent court of arbitration at The Hague, provided that they do not affect the vital interests of either. A 'neutral' zone was established on either side of the frontier from the point where it reaches the coast of the Skagerrak as far north as lat. 61° N. It is about 8 to 10 miles wide, as a rule, on either side of the frontier (see p. 9). No military or naval works of any description may be maintained or established therein, save in the event of joint action against a common enemy. In virtue of this convention Fredrikssten and other Norwegian fortifications were dismantled. Those at Kongsvinger and within a radius of 6 kilometres were not to be in any way augmented. Regulations as to the migration and rights of the Lapps in the northern territories of each state were laid down. The transit trade of either of the states in passage through the territory of the other was safeguarded against delays, increase of tariffs, and other disabilities. Provisions were also made concerning the regulation and use for navigation, power-works, &c., of lakes and waterways common to the two kingdoms.

In Norway, after the dissolution of the union, there was

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a measure of opinion (represented by some 33,000 votes, or roughly one-tenth of the total vote on a referendum) in favour of setting up a republic. But the Norwegian peasantry, in the absence of any aristocracy to stand between it and the Government, had developed a certain intimacy with and fidelity to the Crown; moreover, it was felt that European opinion generally would view the continuation of the monarchy with more favour than the establishment of a republic. The Storting selected the second son of the then Crown Prince Frederick of Denmark as a candidate for the throne; he was elected by referendum, and was crowned in June 1906 under the title of Haakon VII, assuming a name famous in mediaeval Norwegian history.

The Swedish objection, from the point of view of foreign relations, to the dissolution of the union, and incidentally to the previous proposals for a dual foreign ministry, is very frankly stated by a Swedish writer as follows: 'The great value of the late union to Sweden was that it gave her not only the opportunity to direct all her defensive forces against an attack from Russia, but that Norway, in the event of her defeat, could have been converted into a fortress of the finest possible kind. The difficulty for an enemy to bring forward large masses of troops and provisions would be almost insurmountable on account of the geographical nature of Norway and western Sweden, but now everything is altered; for Sweden's back is again bared to attack as it was before the union.'

As to the feeling which was left between Norwegians and Swedes after the union was dissolved, it is hardly possible to generalize. It was broadly and simply stated, shortly before the event, that the Norwegians always appeared to dislike the Swedes, and the Swedes to like the Norwegians; on the other hand, a very eminent Norwegian was able to write that 'we cannot think of the possibility of Sweden being attacked without instantly hastening to its help with all our might.' After the dissolution, the Storting offered an olive branch to King Oscar in proposing to elect as king a member of the

Swedish royal family, but the king, who felt that Norway had dethroned him under a false pretext, refused it. And with whatever affection, or tolerance, the Swedes may previously have regarded the Norwegians, such sentiments was replaced, according to an official Swedish publication, by a 'deep feeling of animosity', which was subsequently 'converted into a powerful national movement' directed towards the strengthening of the kingdom in whatever directions it might have suffered by the dissolution of the union.

CHAPTER VI

GOVERNMENT, ADMINISTRATION, AND FINANCE

Systems of Government—Justice and police—Sanitary conditions and services—Norwegian finance—Swedish finance—Currency.

SYSTEMS OF GOVERNMENT

Norway

Constitution.—The fundamental law of Norway is the Eidsvold Constitution of 1814, as modified after the failure in that year to set up a separate kingdom (see p. 109), and on subsequent occasions. For many years down to 1814 Norway had been a dependency of Denmark, and therefore the framers of the Constitution had little in the way of native institutions on which to work. So they borrowed largely from foreign constitutions of strong democratic tendency, and the practices which they laid down have in great measure survived, firstly, the subsequent union with Sweden in 1814, and secondly, the dissolution of that union in 1905. It is specifically provided that amendments to the Constitution must not be in opposition to its spirit and principles : even so, they can only be presented in the Storting (parliament) during the first regular session following a general election, and adopted only by a two-thirds vote at a regular session following the next subsequent general election.

The Crown and Council of State.—The government is a limited hereditary monarchy, with a stronger popular element than in Sweden. The King (who must be a member of the Lutheran Church) is the supreme executive authority, but for the most part he exercises his executive powers in conjunction with a Council of State. This is the responsible ministry, composed of a minister of State and not less than seven other councillors, appointed by the Crown, and usually, although in

special circumstances not necessarily, members of the Storting, where they may attend and speak, but not vote. The councillors must be Norwegian citizens not less than thirty years old, and Lutherans. Women are eligible (since 1915). The heir to the throne, on attaining the age of eighteen, may attend the Council of State, but does not share its responsibility, and has no vote. The minister of State countersigns all orders issued by the King, except military commands. The King is commander-in-chief of the army and navy, though he may not alter the numbers of the forces or place them at the service of another Power without the authority of the Storting.

Storting.—The Storting is a body of salaried members not less than thirty years old, resident ten years in Norway, and qualified to vote in the individual districts they represent, save in the case of an ex-councillor of State, who (if otherwise qualified) may represent any district. Women are eligible to membership since 1907. The Storting consists of 123 members, representing 41 urban and 82 rural electoral districts. The electoral franchise is extended to all Norwegian men and women not less than 25 years old residing and resident for five years in the country, unless disqualified for such a reason as the receipt, at the time of the election, of parish relief. Election is direct, and electors who for any valid reason cannot poll their votes in person are allowed to transmit them in writing. It is worth remark that the democratic modifications suggested by the above provisions have all taken place since 1898, when a Liberal government abolished the previously existing franchise on a property qualification. Women's suffrage was conceded in stages—they received a restricted municipal franchise in 1901, a restricted parliamentary franchise in 1907, municipal franchise on the same terms as men in 1910, and parliamentary franchise on the same terms in 1913. Elections take place every third year.

The Storting meets annually of right, without summons from the Crown, though the King may convoke an extraordinary session. There is a peculiar provision by which, at the first regular session after a general election, the Storting

divides itself (i. e. without reference to the electors) into two chambers. One-fourth of the members form a body called the *Lagting*; the remainder form the *Odelsting*. Bills are presented first in the *Odelsting*, and if passed there are presented to the *Lagting*, which thus acts as a check on the larger body. The *Lagting*, on consideration of a bill, has power to approve or reject, but not to amend it. If it rejects a bill twice, the two chambers sit together, and the bill requires a two-thirds majority of the whole *Storting*, thus united, to pass. On receipt of the King's approval a measure becomes law; if he does not approve it the *Odelsting* is entitled to a statement of his reasons, but the same *Storting* may not resubmit the measure to him. On the other hand, a measure passed without change by three *Stortings* after three successive general elections becomes law despite the royal veto.

Political Parties.—After the union with Sweden in 1814 it took the peasant population of Norway some years to assert itself in its new parliament, but about 1830 it began to do so. From about 1870 till 1905 party questions were very largely concerned with matters of dispute arising out of the union (see p. 111). A liberal or national party was formed by the fusion of the peasants' representatives and the so-called 'lawyers' party', with a policy of aggression against Sweden: this party remained in opposition till 1884, the Conservatives (who, broadly speaking, represented the upper and official classes) maintaining themselves in power till that year, and adopting in general a conciliatory attitude towards Sweden. After 1884 the two parties alternated in power; events moved towards a consolidation of opinion on the question of the Swedish connexion, and the Government which actually brought about the separation was a coalition, though predominantly Conservative. As this event obliterated the majority of the old party questions, others, mainly social and economic, took their place after 1905, and a noteworthy development was the increase in the number of social democratic members from 11 in 1906 and 1910 to 23 in 1912.

Local Government.—The chief units of local administration

are the cities of Kristiania and Bergen and the eighteen *amter* or counties. The principal officer in each of these divisions is the *amtmand*, appointed by the Crown. Under his presidency a county council (*amsting*) meets annually ; it is composed of the chairmen of rural communes within the *amt*. The communes (*herred*) are usually governed by 12 to 48 representatives elected by universal suffrage, and by a council (*formaend*) elected by and from the representatives, and comprising one-fourth of their number.

Sweden

Constitution.—The revolution of 1809, which brought about the abdication of Gustavus IV (see p. 108) and the extinction of his line in the succession to the Swedish throne, was accompanied by the framing of a new constitution. This fundamental law (*regeringsformen*), now the oldest written constitution in force in Europe, was supplemented shortly after its adoption by an act of settlement or law of royal succession, an organic law for the *Riksdag* or parliament (superceded by the reorganization of the legislative chambers in 1866 and 1909) and a law on the liberty of the press. These laws, which make up one of the most elaborate written constitutions in existence, may be amended without serious restriction as regards procedure : either the Crown or the legislative houses may initiate amendment which (subject to agreement between them) is legalized if approved by the parliament succeeding that in which it was proposed. The constitution, therefore, has been frequently modified in matters of detail.

The Crown and Council of State.—The government is an hereditary monarchy. The king must belong to the Lutheran Church. He governs in conjunction with a Council of State (*Statsråd*) of eleven members, who must be native-born Swedes and Lutherans. One of them is minister of State or prime minister. The king presides at the Council, and must hear its opinions, but in theory is not bound by them. He acts independently as chief of the army and navy, and as regards foreign affairs generally in consultation with the minister of

State, the minister of foreign affairs, and one other councillor ; but on a question of war or peace he must consult the whole council. The king possesses the right of absolute veto in legislative affairs, but this is very seldom exercised. He also has powers in the direction of ' administrative and economic legislation ', covering not only regulations for public offices but also ordinances referring, within certain limits defined by common practice, to public economy and to industries. On these subjects the *Riksdag* in theory can only express its desires to the king, though its opinion is usually invited even if its legislative co-operation be not actually invoked. The councillors of State have seats in the *Riksdag*, and in theory are responsible to it, ' but their responsibility lies so much more directly to the king than to the legislature that what is commonly known as the parliamentary system can hardly be said to exist in the kingdom '.

Riksdag.—The *Riksdag* or parliament consists of a first and a second chamber. The first chamber consists of 150 salaried members, who must be not less than 35 years old, and for not less than three years before election must have owned real estate of a rateable value of not less than 50,000 kronor (about £2,780) and have paid taxes upon an income of at least 3,000 kronor (about £170) a year. The members of the first chamber are elected, not directly by the people, but by the county councils (*landsting* : see below, p. 122) and by the municipal councils of Stockholm, Göteborg, Malmö, Norrköping, and Gäfle. Representation is in proportion to the population of these various divisions, which are arranged in six groups, one of which has an election every year, the members being elected for six years. There is thus never a general election to the first chamber, even if it be dissolved by the Government.

The second chamber consists of 230 salaried members, who must be resident in the constituency for which they stand, and must possess the franchise. This is possessed by every male Swede not less than 24 years old who is not under any legal disability. The second chamber is elected *en bloc* for three

years ; if it be dissolved in a shorter time, the succeeding parliament is elected only for the remainder of the term. The king is required to summon both chambers annually in ordinary session.

The two chambers of the *Riksdag* have equal competence and authority, and a bill must receive the assent of both chambers—with this exception, that if the chambers are at issue over a financial question they vote again upon it jointly, so that if the second chamber has a strong majority its larger number of members may give it preponderance over the first chamber. Committees play an important part in the work of the *Riksdag*. There are six regular committees, namely, those of the constitution, budget (the most important, as the majority of financial questions come within its view), tax, bank (which deals with the management of the *Riksbank*, the national debt board, pensions, &c.), law, and agriculture. If the chambers disagree on any question, other than financial, which lies within the scope of one of these committees, the committee endeavours to find a compromise. Members of both chambers work together in the committees. Select committees may also be appointed by either chamber, and special committees on particular subjects requiring exhaustive examination are often set up.

Proportional Representation.—A system of proportional representation is in force in Sweden. It is a free method as distinct from a list method : the elector has a right to vote for whatever candidate he pleases, and no official lists of candidates are issued. The elector may also place on his voting-paper a party-indication, and all voting-papers bearing the same party-indication, whether they include the same candidates or not, are treated as belonging to one party-group. All papers without party-indication are classified under the free group. The number of seats is divided among the groups, and the seats that each group has thus received are distributed within that group according to proportional principles, in which process consideration is given to the order of names in the voting-papers.

Political Parties.—After the reorganization of the *Riksdag* in 1866 the agricultural party, consisting mainly of peasant representatives, was for many years the strongest. The Centre, or opponents of the agricultural party, were never so closely organized or united. The agricultural party split on the question of protection or free trade in 1888–95, but subsequently it reunited; in 1912 it absorbed the so-called National Progressives, and now, as the Agricultural and Civic Party (*Lantmanna- och borgarpartiet*) it forms the organized Right in the second chamber. The non-socialist Left, the United Liberal party (*Liberala samlingspartiet*), developed out of liberal elements in the Centre and among the old free-trade agriculturals. The Social Democrats have formed a definite group since 1903. The liberal and social democratic organizations cover their respective groups in both chambers, but the Right in the first chamber has its own organization under the name of the National Party, having its origin in a powerful body of protectionists and Conservatives which for many years after 1888 completely dominated the chamber.

Local Government.—Each *län* or county (see p. 66) has a *landsting* or county council, excepting Kalmar Län, which is divided between two such councils. They exercise jurisdiction over both rural and urban districts, excepting such towns as contain more than a hundred-and-fiftieth part of the total population of Sweden (in 1914, Stockholm, Göteborg, Malmö, Norrköping), and excepting also Gäfle, under an earlier privilege—the town councils of these places exercise the ordinary functions of county councils also. The *landsting* is directly elected under the proportional system already described, in the ratio of one councillor for every 3,000 inhabitants in the towns, and for every 5,000 in the rural districts. The councils deal with all matters of administration affecting the *län*; the care of the sick is a specially important function of theirs, and, as has been seen, they have particular political function in the election of members of the first chamber of the *Riksdag*. At the head of each *län* is a governor (*överstatshallare* in Stockholm; *landshövding* elsewhere) as representa-

tive of the Crown. Each *län* is divided for administrative purposes into bailiwicks (*fögderier*), and these into smaller divisions, each under a constable (*länsman*).

Every town, and as a rule every county parish, forms a commune (*kommuner*), of which in 1914 there were 2,510—100 urban and 2,410 rural, the latter figure including a certain number of smaller country towns or large villages which have an intermediate form of local government—and also 164 settlements of modern growth around factories or railway stations, which possess a restricted form of municipal administration. Determinative authority is exercised in theory (and on occasion, at any rate partially, in practice) by the whole body of voters in rural communes and small towns—a survival of the ancient folk-meeting. The rural meetings are called *kommunalstämma*; the urban, *allmänns rådstuga*. Towns with a population under 3,000 may, and larger towns must, elect a town council (*stadsfullmäktige*) in place of the general meeting. The communal franchise is peculiar: each qualified voter (man or woman) may possess any number of votes up to 40 in a town, or one-tenth of the total number of votes in a rural district, according to the amount of the income on which he is liable to pay communal rates. The *kommunalstämma* is under a president, elected by the meeting for four years; the town meeting or council is under a mayor (*borgmästare*: in Göteborg there are two mayors). The mayoralty is a permanent salaried post, to which the Government appoints from among three candidates popularly elected.

JUSTICE AND POLICE

Norway

Civil justice is administered in Norway by a court of first instance in each of 105 districts, composed of two justices elected by the people. There are three higher tribunals, with a chief justice and two associates, and a supreme court (*högsteret*) with a chief justice and six associates, from whose decision there is no appeal. The Lagting (p. 118) and the

supreme court together form a court of impeachment (*rigsret*) to deal with charges of misconduct in office brought by the Odelsting against members of the Council of State, the Supreme Court, or the Storting. For criminal cases there are the *lagmandsret*, consisting of a president and ten jurors, which deals with the more serious cases, and the *meddomsret*, consisting of a judge and two assistants.

In each of 49 districts (the chief towns being centres of some of these) there are police departments in which the chief official is the *politimester*. His assistants vary in number and rank according to the requirements of the districts; thus in Kristiania and Bergen there are a *politiinspektor*, a *politiaadjutant*, and a number of officers called *politifuldmaetiger*; in other important districts the *politifuldmaetig* is the officer next in rank below the *politimester*.

The largest prisons (*landsfaengslerne*) are those of Akershus at Kristiania and Trondhjem for men, and one for women at Kristiania, where there is also a penitentiary. There are district prisons (*kredsfaengslerne*) at Kristiania and Skedsmo, Eker, Trondhjem, Hamar, Drammen, Skien, Kristiansand, Stavanger, Bergen, Molde, Bodö, Tromsö, and Vadsö, which, with the exception of the first three, are under the administration of the local *politimester*, and there are some 50 other smaller prisons (*hjaelpesfaengslerne*), mostly also under the local chief of police.

Sweden

The rural parts of Sweden are divided into 121 judicial districts, each under a district judge (*häradshövding*), and some districts are subdivided, so that in 1914 there were 216 district courts. The judge is assisted by a board of assessors (*namndeman*) chosen by public election to form a species of jury. In towns the borough court of first instance (*rådstuvuratt*) consists of the mayor and two aldermen (*rådmön*). These are paid officials and almost always professional lawyers; the mayor, as has been seen, is appointed by the Government from an elected list, and so are the aldermen in Stockholm; elsewhere the aldermen are directly elected. There are certain

suits, more especially those relating to maritime affairs, bills of exchange, and the liberty of the press, in which the borough courts have the sole right of decision. There are courts of appeal (*hovrätter*) in Stockholm, Jönköping, and Kristianstad. The highest judicial tribunal is the high court of justice (*högsta domstolen*) with a membership of 24 chief justices (*justitieråd*). Special tribunals include, among others, a court of impeachment, audit court, ecclesiastical court, and a supreme administrative court forming a court of appeal from the decisions of administrative boards, which deal in the first instance with cases arising out of the discharge of their functions by public servants.

In the towns of Stockholm, Malmö, and Göteborg there are separate police departments under a chief officer called *polismästare*; elsewhere the police are under the municipal or county authorities. There are central prisons (*centralfängelser*) at Långholmen (Stockholm), Malmö, Harlanda near Göteborg, Härnösand, and Växjö, so-called penal prisons (*strafffängelser*) at Stockholm, Uppsala, Linköping, Jönköping, Kalmar, Karlskrona, Kristianstad, Vänersborg, Mariestad, Karlstad, Örebro, Västerås, Falun, and Gäfle, and smaller gaols at 18 other principal towns, and several more in other localities. They are under governors or superintendents, and are administered by a special board.

SANITARY CONDITIONS AND SERVICES

General health conditions in the Scandinavian peninsula differ little from those of adjacent parts of Europe and the British Isles; sanitary conditions are on the whole satisfactory, and the climate (allowing for its rigour in most parts in winter) is favourable to health. Severe epidemic diseases are rare; an acute bronchial catarrh is mentioned as one of the most serious. In Norway, in 1911–15, there were from 68,000 to 88,000 cases of this complaint annually, the mortality from it being a little over 1,000 in each year. Among chronic diseases tuberculosis is the worst, and measures against it have received close attention both in Norway and in Sweden. Leprosy still appears, though to an extent much less than

formerly. Among diseases unfamiliar in Britain mention may be made of scurvy, which is rare except in the northern districts where (at any rate on the Norwegian seaboard) a few cases are recorded annually, and the so-called 'lemming fever' which is traced to the pollution of water by dead lemmings when these animals make their periodical migrations.

Norway.—In Norway there is a civil medical board under the department of justice. Apart from physicians in private practice, the country is divided into urban and rural health districts with superintendent medical officers. These officers are called *stadsfysikus* in Kristiania, Fredrikstad, Drammen, Kristiansand, Stavanger, Bergen, and Trondhjem; and *stadslæger* in Fredrikshald, Moss, Hamar, Kongsberg, Horten, Tönsberg, Larvik, Arendal, Risör, Mandal, Egersund, Bodö, Narvik, and Tromsö. County medical officers (*amtslæger*) are stationed at Bodö for Nordlands *amt* and at Vardö for Finmarkens *amt*, and in every *amt*, in varying numbers from 35 downward according to its size and population, there are district medical officers (*distriktlæger*). There are also a limited number of qualified advisers in matters of health (*ordførere i helseraad*) in certain rural centres and small towns. The sole right of selling drugs is in the hands of licensed chemists, established mostly in the towns, and comparatively few in number (about 200). The State maintains at Kristiania a hospital (*rikshospitalet*, with an average daily number of patients of about 400) and a women's clinic, and at Bergen a lying-in-hospital and a school of midwifery. It also maintains tuberculosis sanatoria at Reknes (Molde), Landesbogen (Saetersdal), and Vensmoen (Saltdal), a hospital for scrofulous complaints at Vadsö, lepers' institutions at Bergen and Trondhjem, and lunatic asylums at Gaustad near Kristiania, Eg near Kristiansand, Rotvold near Trondhjem, and Rönvik near Bodö. There are 16 communal and private lunatic asylums, and an inspector of lunacy for each *amt*. In most of the *amter* (counties) there are one or more infirmaries erected and maintained, directly or indirectly, out of county funds, and there are municipal infirmaries in a number of towns. Private

sanatoria and bathing establishments are numerous in many parts of the country. Many sanatoria are open only in summer. Among larger bathing-places may be named Sandefjord, Larvik, Modum, and Eidsvold. At the two first sulphurous springs and mud baths supply the principal remedies; at the two last, iron springs and baths. A primitive form of Turkish baths, called *badstuer*, is to be found in a number of towns, especially in the north.

Quarantine stations are maintained at Kristiansand and Tromsø, and provisionally (1917) at Risöen near Lyngör.

Sweden.—In Sweden the civil medical service is under the control of a Royal Medical Board, at the head of which is a Director-General. The universities of Uppsala and Lund, and the Karolinska Institute at Stockholm, train medical students. There are somewhat more than 400 medical men in private practice only; apart from these, there are approximately 1,000 official medical appointments (as urban and rural district medical officers, hospital and asylum surgeons and doctors, prison and railway doctors), of which, in some instances, more than one are held by the same individual. Of these, about 340 are provisional medical officers (*provinsial-läkare*), paid either by the State alone or by the State and communes together, or by the communes only, or, in some instances, by private contributions. The *förste* (first) *provinsialläkare* in each *län* except Stockholm, Göteborg, and Malmö towns is inspector of the whole civil medical service in the *län*. In all the principal towns there are similarly appointed medical officers (*stadsläkare*). As in Norway, drugs and medicines may be sold only at the establishments of chemists licensed by the State, of whom there are somewhat less than 400. The oldest and most important general hospital is the Serafimerlasarett at Stockholm, and every county council and town outside county jurisdiction is bound to establish and maintain hospitals. The care of the feeble-minded is incumbent on the State, which maintains 17 hospitals and asylums for them. For tuberculosis and other diseases of the lungs there are four sanatoria (Hålahult, Österås, Hässleby near

Mariannelund, Spenshult near Johansfors) established and maintained by the King Oscar II Jubilee Fund, and of sanatoria and tuberculosis hospitals maintained by *läns* and towns there are 25. There are many such sanatoria and other institutions under private maintenance, and the total number of hospitals, asylums, homes, &c., in Sweden is over 500. There are about 1,000 trained sick-nurses in such institutions, and over 500 appointed to service in provincial medical districts, &c. Vaccination is supervised with especial care in Sweden.

Watering- and bathing-places and general sanatoria are numerous. Mineral springs are mostly chalybeate, such as those at Ronneby, Porla, Lundsbrunn, Ramlösa, &c.; that of Sofia (Hälsingborg) is chlorine. 'Water cures' are much in favour, such as those of Söderköping, Bie, Södertälje, Mösseberg, Hjo, Ulricehamn, and Saltsjöbaden, and there are several well-known seaside sanatoria, such as Strömstad, Marstrand, Lysekil, and Varberg on the west coast, and Borgholm, Visby (Gotland), Nynäs, Norrtälje, &c., on the Baltic. The Swedish mud-bath (as at Loka) is a characteristic and peculiar institution. At many health resorts there are 'bath hospitals' for cheap or free treatment.

A quarantine station is maintained at Käsö near Göteborg.

NORWEGIAN FINANCE

Revenue and Expenditure

The revenue and expenditure of Norway for the financial year 1913-14 (the latest full year under normal conditions) and for that of 1917-18 (budget estimates) are given in the following tables :

	<i>Revenue</i>	1913-14. <i>Kroner.</i>	1917-18. <i>Kroner.</i>
Ordinary :			
Income tax		12,400,000	58,600,000
Customs		54,000,000	58,000,000
Excise, spirits		2,550,000	660,000
„ beer		4,000,000	2,000,000
„ tobacco		—	3,020,000
„ matches		—	1,500,000
Succession duties		1,250,000	2,000,000
Stamps		2,185,000	12,100,000

	1913-14. <i>Kroner.</i>	1917-18. <i>Kroner.</i>
Judicial fees	1,250,000	1,400,000
Luxuries tax	—	1,000,000
Mines	880,400	1,207,700
Post office	10,000,000	14,650,000
Telegraphs and telephones	8,050,000	15,000,000
State property	5,650,400	9,420,800
Railways	26,570,400	51,061,600
Miscellaneous	13,234,200	17,839,900
Extraordinary :		
Loans for railway construction	9,281,100	—
Local subscriptions for railway construction	1,779,200	—
Earlier surpluses for railway construction	1,161,800	—
Other earlier surpluses	5,460,000	4,775,000
Excess profits tax	—	114,175,000
Tonnage tax	—	18,000,000
Loans	—	54,497,500
Miscellaneous	—	404,500
Total	159,702,100	441,252,000
	(£8,872,339)	(£24,514,000)

*Expenditure***Ordinary :**

Civil list	751,800	776,800
Storting	796,700	1,092,800
Ministries	2,055,200	3,631,000
Church, arts, and education	17,356,200	27,731,400
Justice	5,097,900	7,789,200
Interior	12,735,600	25,108,400
Posts, telegraphs, &c.	18,874,400	36,337,000
State railways (traffic)	25,275,900	53,900,500
Roads, canals, ports, &c.	6,872,600	10,983,600
Finance and customs	6,208,800	9,469,300
Mines	886,500	1,181,400
Redemption of national debt	5,358,200	6,031,100
Interest on debt	12,372,700	17,382,400
Army	16,597,400	30,829,800
Navy	9,124,900	14,029,300
Foreign affairs	1,051,900	1,455,800
Miscellaneous	603,300	1,070,200

Extraordinary :

Railway construction	12,222,100	20,377,900
Telegraph and telephone construction	2,900,000	6,719,100
Other public works	—	5,267,500
Defence (special expenditure)	405,000	25,912,500
Special funds	—	1,000,000
Scarcity measures	—	105,450,000
Scarcity allowances to public officials, &c.	—	26,725,000
Miscellaneous	2,155,000	400,000
Total	159,702,100	441,252,000
	(£8,872,339)	(£24,514,000)

In the expenditure for 1917-18, under the heading of defence (special expenditure) it is noted that neutrality expenditure, estimated at about 2,000,000 kroner per month, is not included. The income and property tax is on a graduated scale in respect of income, and is not levied (normally) on incomes below 1,000 kroner. The revenue from productive funds of the State is proportionately less considerable than that of Sweden (see below), as none of the national properties (railways, posts and telegraphs, forests, the Kongsberg silver mines, &c.) is very lucrative; the railways in particular being very costly to construct and maintain, have been little remunerative; and it will be noticed that in 1917-18 the working expenses of the railways substantially exceeded the receipts.

National Debt

The national debt in 1890 amounted to 115,357,500 kroner, and at the end of 1916 to 422,975,441 kroner or nearly £23,500,000. During this period it has increased in much the same proportion as that of Sweden (see below), but it is about 15 kroner per head of the population higher than Sweden's debt. The earliest public loans were chiefly connected with the settlement of the debt inherited from the union with Denmark, but since the middle of the nineteenth century the loans raised have been applied almost wholly to productive public works, especially railway construction; another special object, on several occasions, has been the increasing of the working capital of the Norges Hypothekbank (mortgage bank).

Banks

The State bank of Norway, *Norges Bank*, is a joint-stock bank in which the State has a large interest; it is governed by special laws enacted by the State for that purpose, and its directors are elected by the Storting, excepting the president and vice-president who are nominated by the Crown. The bank is obliged, without compensation, to take charge of the money transactions of the State, and its net income is divided between the stock-holders, the treasury, and a reserve fund. The capital is 25,000,000 kroner. The bank is the only one in Norway authorized to issue notes, which are for 5, 10, 50,

100, 500, and 1,000 kroner. The head office of the bank is in Kristiania, and there are twenty branches in other important towns. *Kongeriget Norges Hypothekbank* is a mortgage bank, the capital of which (28,000,000 kroner) is mostly furnished by the State; it serves the purpose of granting loans on real estate. Its head-quarters are in Kristiania, and there are branches in Bergen, Trondhjem, and Tromsö. Under the same management an employment and building bank (*Den Norske Arbeiderbruk og Beligbank*) is maintained. There are a large number of private joint-stock banks, and also of savings banks, which must be chartered by royal licence, and are controlled by the ministry of finance.

SWEDISH FINANCE

Revenue and Expenditure

The revenue and expenditure for the years 1913 (the latest full year under normal conditions) and 1918 (budget estimates) are given in the following tables:

	<i>Revenue</i>	1913.	1918.
(a) <i>Taxes and dues ('State revenue proper')</i> :	<i>Kronor.</i>	<i>Kronor.</i>	
Capitation tax	853,809	850,000	
Tax on incomes, property, &c.	41,837,913	104,450,000	
Succession and other stamp duties	18,653,021	27,400,000	
Tax on war profits	—	40,000,000	
Tonnage duty	—	5,000,000	
Customs	69,718,043	70,000,000	
Excise on spirits, malt, sugar, and tobacco	50,376,771	56,255,000	
Miscellaneous	7,724,367	9,291,600	
(b) <i>Net revenue from productive funds</i> :			
State railways	21,825,903	21,500,000	
Posts and telegraphs	10,523,403	18,715,500	
Waterfall works	1,531,693	5,150,000	
Crown lands (land-leases and forests)	10,316,344	15,000,000	
Interest on shares in Luossavara-Ki-runavara iron mines	2,468,291	1,437,000	
Interest on shares in Swedish Tobacco Monopoly Co.	—	4,500,000	
Interest on outstanding loans	—	4,416,000	
Fund from liquor revenue	—	200,000	
Share in profit of National Bank	6,311,000	—	
(c) <i>Capital assets taken into use</i>	—	58,151,400	
(d) <i>Loans</i>	—	232,985,800	
Total	242,140,558	675,002,300	
	(£13,333,731)	(£37,169,730)	

132 GOVERNMENT, ADMINISTRATION, AND FINANCE

<i>Expenditure</i>	1913.	1918.
(a) <i>Expenses:</i>	<i>Kronor.</i>	<i>Kronor.</i>
Defence (army and navy)	82,769,453	279,471,887
Education, church, &c.	31,464,888	53,253,600
Other departments of State, Civil List, &c.	58,061,687	155,704,100
Pensions (old age, insurance, &c.) . .	8,620,272	13,704,513
Interest on national debt	23,981,000	57,118,000
(b) <i>Improvement of State property, reduction of debt, &c.:</i>		
State business undertakings	51,774,900	83,188,600
Loans to private railways, &c. . . .	—	11,680,000
Amortization of national debt . . .	6,355,000	5,351,600
Grain storehouses, &c.	—	8,000,000
Other expenditure (including fund for provisional increase of army and navy pay)	—	7,530,000
Total	263,027,200	675,002,300
	(£14,483,877)	(£37,169,730)

The principal direct tax is an income and property tax on a graduated scale, on incomes of 800 kr. or property of 6,000 kr. and upwards. A special defence tax for the re-organization of the army and navy was determined upon in 1914, to be levied only upon incomes of 5,000 kr. or properties of 30,000 kr. and upwards. The importance of customs and excise is apparent from the table (for the customs service see p. 204). As for the revenue from productive funds of the State, it may be mentioned that in 1913 the yield on capital invested in Swedish State railways was 3·58 per cent., that on posts 35·93 per cent., and that on telegraphs 7·75 per cent. In 1914 a State tobacco monopoly was created, to be leased to a private company, of which, however, the State was to hold at least one-half the capital.

National Debt

The national debt of Sweden has increased largely of late years: in 1890 it was 259,513,000 kr.; at the end of 1913, 622,561,000 kr., and at the beginning of 1917, 930,216,812 kr. or over £51,000,000. Even so, in proportion to the population, it is a small debt as compared with those of most

European countries. Moreover it has been incurred, at least until very recently, wholly for productive purposes—the construction or purchase of railways (principally), development of water-power, and of iron-ore fields, agricultural development, &c., ‘Even the great reconstruction of national defence agreed upon in 1914 was based altogether on an exceptional tax of 75,000,000 kr. and not upon borrowed moneys’ (see above).

Banks

The State bank of Sweden, *Sveriges Riksbank*, is administered by a court of directors appointed by the Riksdag, under a chairman nominated by the Crown. The court elects three of its own members to be managing directors. The capital of the bank is 50,000,000 kronor. At least 10 per cent. of the annual profit is passed to reserve until that has become 25 per cent. of the capital; the rest of the profit is at the disposal of the Riksdag. The bank issues notes (1 krona,¹ 5, 10, 50, 100, 1,000 kronor) to double the amount of the gold in hand, which is intended to be kept up to at least 75,000,000 kronor; issue to a further sum of 125,000,000 kronor is also allowed, provided that it is backed by certain specific securities. The Riksbank has 25 branches, being bound to maintain at least one in each *län* other than Stockholm. Under an Act of 1911, banking business is defined as the receipt of deposits from the general public; thus, co-operative societies receiving deposits only from their own members do not rank as banks. The term *bank* is confined to the Riksbank, joint-stock banks, unlimited liability banking companies, underwriting banks (created to assist in the formation of joint-stock trading companies by underwriting shares), post-office and other savings banks, the Iron Institute (*Jernkontoret*: founded to give financial support and encouragement to the iron industry), and the General Mortgage Bank. The three largest banks other than

¹ The 5 kronor note is usually the lowest; notes for 1 krona began to be issued in September 1914.

the Riksbank are Skandinaviska Kreditaktiebolaget, Stockholms Handelsbank, and Stockholms Enskilda Bank. Aktiebolaget Sveriges Privata Centralbank is a central organization for a number of provincial banks. A number of mortgage banks serve the interests of agriculture and other purposes. In addition to a post office savings bank Sweden has a system of private savings banks under little legal restriction, and various credit companies and the Co-operative Union and societies carry on savings-fund business.

CURRENCY

Norway and Sweden have each a gold standard. The reckoning unit is the *krone* (in Norwegian) or *krona* (in Swedish), divided into 100 *öre*. Approximately 18·16 *kroner* (*kronor*) equal £1, or one krone equals 1s. 1½d. Swedish gold coins are 20, 10, and 5 kronor pieces; silver, 2 kronor, 1 krona, and 50, 25, and 10 öre; bronze, 5, 2, and 1 öre. Gold coins are legal tender to any amount; 2 krona and 1 krona pieces up to 20 kronor; smaller silver coins up to 5 kronor, and bronze up to 1 krona. The Norwegian monetary arrangements are approximately the same; Sweden, Norway, and Denmark have the same coinage system, and the coinage of any of these countries is legal tender in the others. The notes of the Norwegian and Swedish banks are referred to in the sections on *Banks*, above.

CHAPTER VII

AGRICULTURE AND FORESTRY

AGRICULTURE IN NORWAY

NATURAL conditions in Norway are unfavourable to agriculture. The arable land occurs in narrow strips in deep valleys and there are no large continuous tracts suitable for cultivation. The total area of cultivated land in 1913 was about 1,500,000 acres, or only about 2 per cent. of the country. This was divided as follows : cereals and root crops, 500,000 acres ; hay, green fodder and fallow land, 1,000,000 acres. In addition there were about 775,000 acres of natural meadow. Norway with its 3 per cent. of agricultural land was poorer than any other country in western Europe. As a result of war conditions causing a shortage of food in Norway efforts were made to increase the area of cultivation. By 1917 another 500,000 acres were under crops, and there were 860,800 acres of natural meadow used for pasture and hay.

Since the population of Norway is small the agricultural land, small as it is in area, looms larger in the national economy than the above figures would suggest. It works out at about an acre to every inhabitant. More people are engaged in agriculture than in any other pursuit in Norway but practically all engage also in fishing. Large farms are rare and the average farm has an area of $7\frac{1}{2}$ acres. Communal ownership which used to be the rule now exists only in mountain pastures.

CULTIVATION OF CROPS

Cereals

The cereals cultivated differ a great deal with the varying climates from south to north and west to east. Oats, barley, rye, wheat, and peas are cultivated.

The areas of these crops in 1913 and 1917 were as follows (in acres) :

<i>Year.</i>	<i>Wheat.</i>	<i>Barley.</i>	<i>Oats.</i>	<i>Mixed corn.</i>	<i>Rye.</i>
1913	12,415	89,408	269,605	15,140	37,471
1917	19,456	115,596	355,062	16,796	57,551

In 1913 and 1917 the production in tons of the chief cereal crops was as follows :

<i>Year.</i>	<i>Oats.</i>	<i>Rye.</i>	<i>Barley.</i>	<i>Wheat.</i>
1913	198,499	24,696	73,353	88,210
1917	246,807	29,432	87,543	117,130

The yield per acre is high, but does not equal the figures for Denmark, though on the whole it exceeds those for Sweden. Careful cultivation, sufficient manure, and the small acreage of the farms accounts for the high production.

Wheat, which is generally spring wheat, will grow profitably only in a few places and is rarely found north of Trondhjemfjord.

Oats are the chief grain of the country but in many parts is being replaced by barley, which ripens earlier and is less liable to injury. Barley matures as far north as lat. 70° N.

Rye is sown both as a winter and spring crop, as far north as lat. 70° N. Winter rye gives the heaviest yield but is liable to be damaged by the alternation of frost and thaw in winter. Leguminous crops are cultivated in the south-east and around Trondhjemfjord.

Grain Resources and Demand

The total home production of cereals is not much over 400,000 tons and quite inadequate to meet the demand. Under normal conditions nearly 500,000 tons are imported annually, chiefly from Germany, Russia, the United States and the Argentine. Imported rye and wheat have largely supplanted home grown barley and oats. The home supply has been a little increased in recent years, and a considerable quantity of barley and oats formerly used for animal food has been diverted for human consumption.

Root Crops

Potatoes are the only root crop which is extensively cultivated. They grow well in all the inhabited parts of the country. In 1913 there were 103,933 acres under potatoes and the total crop was about 600,000 tons. In 1917 the potato acreage was 144,865 acres and the yield 1,080,470 tons. This suffices for the needs of the population. The only other root crops grown are turnips and carrots and they are of small importance.

Sugar Beet

Attempts are being made to cultivate beets in the south-west of the country. The result promises well in the proportion of sugar, but the success of the experiment depends on an adequate duty being put on imported sugar. The promoters of the home sugar industry ask for a duty of 10 öre per kilogramme ($\frac{1}{2}$ d. per lb.) for 15 years.

Fodder Crops

The hay harvest is the most important in Norwegian agriculture, and great care is taken in drying hay on low fences. In 1913 the harvest was 3,071,782 tons: in 1916 it was 3,075,007 tons but in 1917 had fallen to 2,526,356 tons. Some of it is sold to the United Kingdom. Much of the hay comes from the natural pastures at the *saeter* or summer farms.

Fruit Crops

Apples, pears, cherries and berry fruit ripen well, especially in the south-east, but little attention is paid to them. The chief fruits used for food are wild berries (see p. 50).

LIVE STOCK

Live stock is important in Norway as the climate favours pasture land where the soil is suitable.

LIVE STOCK IN NORWAY IN SEPTEMBER 1916

<i>Horses.</i>	<i>Cattle.</i>	<i>Sheep.</i>	<i>Goats.</i>	<i>Swine.</i>
189,175	1,119,306	1,281,030	230,055	221,217

Cattle

Cattle are kept principally for milk. They are of small mountain-breeds, and attempts to introduce Ayrshire, Dutch and Frisian breeds have not been highly successful. In the north of Norway the peasants are faced with the difficulty of providing fodder in winter after the hay has been used, and have resorted with much success to the use of cod heads, boiled with seaweed or a little hay if any remains. Whales' flesh has also been used on occasions. In the coastal regions and on islands where pasture and hay are always scarce, seaweed is regularly used for fodder. It is a common Norwegian practice to take the cattle in summer to the *saeter*, or out-farm, situated in the mountains 10, 30 or even 50 miles from the home-farm, for the sake of the fresh pasture. The cattle return in September.

Horses

There are two types of horses in Norway, the 'fjord horse' of the west, and the Gudbrandsdal horse of the east. The fjord horse is small and hardy and incomparable for mountain work. The Gudbrandsdal horse is larger, and makes a good farm draught horse.

Reindeer

Reindeer herds are kept mainly by Lapps whom they provide with most of their nutriment. The reindeer are found in the mountainous districts in the north and only during the winter come to the lower districts along the coast. There are about 200,000 reindeer in Norway.

Dairy-farming

Since the introduction of co-operative methods some 40 to 50 years ago dairy-farming has made considerable progress, and large quantities of butter are produced, a great proportion of which is exported to Britain. Cheese dairies also exist but have not been very successful in meeting the demands of foreign markets. Butter and cheese are also

made in every farm for local use. Cheese is a staple article of diet in Norway. A great deal of milk is tinned for export. For import and export values, see Chap. XI.

Government Aid

The Government gives considerable help to agriculture in reclaiming and draining soil, instruction in all agricultural matters, state laboratories, loans and in other ways.

IMPORTS AND EXPORTS OF RAW FOOD PRODUCTS, 1914

	<i>Import.</i> met. tons.	<i>Export.</i> met. tons.
Live stock	7,873	2,328
Meat, fish, butter, cheese, eggs	29,525	343,766
Cereals and cereal foods	451,825	12,073
Rice and sago	6,754	—
Sugar and syrup	70,261	—
Fruits	21,005	604
Vegetables	9,776	469

Export of goods in transit through Norway are excluded.

AGRICULTURE IN SWEDEN

Agriculture is still the chief occupation in Sweden, although in recent years its relative preponderance has decreased in favour of the manufacturing industry, which leads in the value of products. There is, however, a steady increase in the productivity of the land despite the decrease in numbers employed in agriculture. This is due to the employment of better methods of agriculture, artificial manures and machinery. In parts of the country, however, the lack of labour is a drawback to an increase in the agricultural intensity.

Sweden may be divided by the Dalälff into two parts, in the southern of which agriculture is of great importance, and in the northern of which agriculture is dwarfed by forestry. The clay soils are the most fertile, and they occur chiefly in the central and southern parts, where the climate is also a favourable factor. The sandy soils of the highlands of Småland, Västergötland, and most of northern Sweden are poorer though easier to work. The humus and peat of swamp and bogland which occur here and there throughout

the country are good for oats, green fodder and hay. Rain-fall does not on the whole favour agriculture, for the droughts which are liable to occur in May and June arrest development, and the heavy rainfall of July and August delays the harvest and injures the crops.

Most of the farmers own their land, and about 90 per cent. of the cultivated land is in small farms of under 50 acres.

The total area of arable land in 1914 was over 9 million acres, or nearly 9 per cent. of the country. It was divided as follows :

	<i>Acres.</i>
Cereals	4,149,353
Leguminous crops	92,221
Hay and green fodder	3,416,388
Root crops	645,799
Other crops	6,938
Fallow land	846,328
Total	9,157,027

In addition there are about 3,300,000 acres of natural meadow land, or about 3 per cent. of the country. Thus the total of arable and meadow is only 12 per cent. of the country. It is, on the other hand, high in proportion to the population, and works out roughly at about two acres to every inhabitant, which is twice the amount in Norway.

War conditions have resulted in slightly more land being cultivated. In 1918 the increase was 46,600 acres, principally in peas and rye.

CULTIVATION OF CROPS

Cereals and Leguminous Crops

The cereals cultivated are oats, rye, barley, wheat, and meslin, a mixture of wheat and rye. Peas, beans, and vetches are also cultivated. The acreage of these crops, in acres, in 1913 and 1917 was as follows :

<i>Year.</i>	<i>Oats.</i>	<i>Rye.</i>	<i>Barley.</i>	<i>Wheat.</i>	<i>Meslin.</i>	<i>Leguminous.</i>	<i>Total.</i>
1913	1,973,678	910,393	441,488	287,533	422,741	61,009	3,674,101
1917	1,932,503	814,317	437,852	329,060	617,822	96,645	4,428,199

The production in tons of the chief cereal crops in 1913 and 1917 was as follows:

<i>Years.</i>	<i>Oats.</i>	<i>Rye.</i>	<i>Barley.</i>	<i>Wheat.</i>	<i>Meslin.</i>	<i>Leguminous.</i>	<i>Total.</i>
1913	1,401,428	584,464	368,674	258,600	364,244	55,096	3,032,516
1917	974,576	357,654	256,044	186,809	325,990	39,502	2,140,575

The harvest in 1913 was well above the average. The yield per acre is in excess of the figure in eastern Europe but not equal to that in the countries of western Europe. The decrease in production in 1917 despite increased acreage is not explained. The yield is the lowest since 1904.

Wheat is grown chiefly in Skåne and east central Sweden. There is none in Norrland. Night frosts are injurious in summer and restrict the area of wheat in favour of rye. Rye occurs chiefly in the eastern parts of central and southern Sweden, but along the coast is found as far north as Haparanda. Wheat and rye are the chief grains used for human food. Both are grown principally as winter grain. Oats are grown throughout the country, but principally south of lat. 62° N. in the west. Their cultivation is increasing largely for cattle food. Barley is grown everywhere, but principally north of lat. 62° N. It used to be the principal crop in Sweden but has gradually declined in importance and become restricted to the less favourable northern lands. Its chief use is now for brewing.

Grain Resources and Demands

The consumption of cereals per head of the population is steadily increasing. In 1910 the total of all cereals was 1,126 lb. per head, of which 440 lb. were wheat and rye. Since about 1880 the total home production of cereals has been unequal to the demand, and since 1860 there has been a deficiency in the home production of wheat and rye. These deficiencies are met by importation. For the value of imports, see Chap. XI:

IMPORTS AND EXPORTS OF CEREALS IN 1913 (in tons)

	<i>Imports.</i>	<i>Exports.</i>
Cereals . . .	427,596	71,607
Flour . . .	23,297	5,046
Products . . .	63,907	25,863

The large quantities of grain used for cattle-feeding could in case of war and prevention of imports be used for human food. According to the figures for 1913 given above, the total cereal production of Sweden is 3,000,000 tons. With a population not exceeding 6,000,000 this would afford about 1,000 lb. per head of the population, which is approximately the present consumption. The destruction of much of the live stock would moreover give a great deal of land suitable for cereal production.

Root Crops

The root crops cultivated in Sweden are potatoes, beet, turnips and carrots. In 1913 there were 383,270 acres under potatoes and the crop amounted to 1,969,074 tons. Other root crops had an acreage of about 256,000 and a yield of 3,254,000 tons. It is comparatively recently in Sweden that much attention has been paid to potatoes as food. Their cultivation is increasing, but there is still room for great extension. In 1917 there were 399,033 acres under potatoes with a yield of 2,278,000 tons. The yield per acre is low, chiefly due to the choice of unsuitable varieties and to poor manuring. Potatoes are also imported to the extent of 20,000 tons (1913). About 100,000 tons are used annually in the distillation of spirits.

Sugar Beet

The cultivation of sugar beet is increasing. In 1914 the crop was about 877,258 tons. The amount of sugar obtained from the beets is growing. The seed is mostly obtained from Germany. Cultivation is restricted to the south of the country, including Öland.

Fodder Crops

Fodder crops in 1914 accounted for 37 per cent. of the total area of cultivated land, and more than half of this was under hay. The hay harvest is early in July in the south and at the end of July in the north. Including the harvest from natural meadows the total hay harvest of Sweden in 1914 was about 5,200,000 tons. In 1916 it rose to 7,000,000 tons.

Natural Pastures

There are also extensive natural pastures for which no figures are available. In Norrland and Dalarne forest and mountain pastures are still relied on, the cattle being taken there from the farms in the early summer. In central and southern Sweden pasturage is employed only for milk-cows.

Flax and Tobacco

Flax is cultivated in the southern provinces of Norrland and in Götaland. The production in 1914 was 182 tons. It is used in Swedish linen factories (see p. 194). Tobacco of a somewhat coarse kind is grown around Åhus, but occupies only a small area. In 1914 the yield of tobacco was 655 tons, and in 1916 it rose to 738 tons.

Fruit Cultivation

Apples and pears are grown widely in the central and southern parts of the country, and factories have been started in which the fruit is dried. It is claimed that in a few years Sweden will produce enough dried fruits to supply home needs. Berry fruits are grown everywhere in Sweden.

LIVE STOCK

Cattle and horse farming is one of the chief aspects of Swedish agriculture. There are also numbers of sheep, pigs, reindeer, &c.

The number of live stock in Sweden in 1913 and 1917 was as follows :

<i>Year.</i>	<i>Horses.</i>	<i>Cattle.</i>	<i>Sheep.</i>	<i>Pigs.</i>
1913	596,136	2,720,748	988,163	967,687
1917	715,100	3,020,381	1,344,202	1,029,967

In the number of animals there was a decline until recent years but the quality improved. More attention has also been paid to the feeding of the stock by the increase in cultivation of fodder plants and the import of oil-cakes and other food. In years of unfavourable fodder harvest the number of the live stock must be reduced. Cattle and horse breeding are encouraged by Government prizes.

Cattle

Cattle have hitherto been bred chiefly for milk production, but the milk-type is not so strongly marked that the animals cannot be used also for meat. Considerable care is being devoted to the improvement of the breeds. For dairy farming see pp. 198, 199.

Sheep, goats, and pigs

Sheep are particularly important in Gotland, and Cheviot rams have been introduced to improve the breed.

Goats are most harmful to young forest trees, and consequently the tendency was to decrease the number of goats as the rising demand for timber enhanced the value of the forests. But domestic goat-rearing is now increasing.

Pig-breeding grew in importance during the last ten years before the war in response to the demand of Britain for pork. Only in the dairy-farming districts, where waste from the dairies makes cheap pig food, is there a surplus for export.

Horses

Three types of horses are bred, thoroughbreds and half-breds, farm-horses and draught-horses, and ponies. Only a small number of thoroughbred horses are bred, and almost

exclusively from English stallions. They are chiefly for the use of the army. Light half-breds of Hanoverian and Oldenburgian strain come chiefly from Skåne. These are also army horses and some are exported to Denmark for army purposes. The breeding of these horses is on the decline.

Light horses of pure native breed are much used for general purposes in the central and northern parts of Sweden.

Heavy draught horses are of the Clydesdale, Belgian, and other strains. A number of these are exported to Germany.

Pony breeding used to flourish in Gotland but is now dying out, and the demand for ponies in Sweden is met by importation from Iceland.

Reindeer

Reindeer breeding is confined to Lapland and carried on chiefly by the Lapps. The occupation is divided into the breeding of mountain reindeer and the breeding of forest reindeer. The former is carried on from the extreme north of Norrbotten as far south as Dalarne and the herds often cross over into Norway and even reach the coast in search of grass. The forest reindeer migrate less and keep within the pine forests. Swedes and Finns as well as Lapps engage in the occupation. It is pursued chiefly in two districts, the chief of which adjoins Finland while the other lies between the lower reaches of the Luleälf and Vindelälf. Reindeer-breeding is in a flourishing state though possibly the numbers of reindeer are overtaking the available pasturage grounds in Sweden, but the mountain reindeer wander throughout Lapland irrespective of boundaries.

The number of reindeer in Sweden is only approximate. In 1913 there were probably not less, but possibly more, than 280,000. Over three-quarters of these were mountain reindeer, most of which belonged to Lapps. Of the forest reindeer over half belonged to Swedes and Finns. There is a considerable trade in skins, meat, horns, &c., but no figures are available for this.

Poultry

Poultry-farming is an important occupation only in the south of the country, whence large numbers of eggs are exported, chiefly to the British Isles either direct or via Denmark. There are state grants to encourage poultry-farming.

Bees

Bee-keeping is a thriving industry and large quantities of wax and honey are produced. In 1911 the production of honey was about 1,320,000 lb. and of wax about 24,000 lb.

IMPORT AND EXPORT OF LIVESTOCK, MEAT, 1913

	<i>Imports.</i>	<i>Exports.</i>
Horses (number) . . .	2,431	6,837
Cattle (number) . . .	2,891	42,254
Sheep (number) . . .	134	2,395
Meat, including pork (tons)	4,550	13,052
Suet and tallow (tons) . .	4,467	536

For import and export values, see Chap. XI.

Dairy-farming

The dairy industry has made great progress in Sweden since the introduction of Danish co-operative methods about 1890. The milk is used for human food, calves' and pigs' food, and for manufacturing butter and cheese. A small quantity of cream is exported to Germany. About two-thirds of the milk is used for butter and cheese. In 1910 Sweden had 550 co-operative and 866 other dairies. The co-operative system has gained most ground in the south and north of the country. In 1914 the total number of dairies was 1,627.

Butter occupies the first place among dairy products, and is made chiefly in Skåne, Halland, and the districts south and west of Stockholm. In 1914 the total output was 31,906 tons. The home butter market is protected by a duty of 20 öre per kilogramme (about 1*d.* per lb.) with the principal object of excluding cheap Siberian butter. Most of the Swedish butter is exported via Göteborg, Malmö, and Halmstad. In 1912

Britain took 75 per cent., Denmark 20·7 per cent., and Germany 4 per cent. In order to protect Swedish butter from imitation all that is exported bears a special mark, the rune mark. This implies a Government guarantee that the butter does not contain more than 16 per cent. of water. Prices are largely regulated by quotations on the Copenhagen market.

The manufacture of cheese is slowly increasing as regards rich or fat cheeses, but decreasing as regards other kinds; most is made in Skaraborg, Östergötland and Jämtland. In 1914 the total production was approximately 13,000 tons, which was mainly for home consumption. Large quantities of cheese are also imported from Holland, France, and Germany. For import and export values, see Chap. XI.

IMPORT AND EXPORT OF DAIRY PRODUCE, 1913

	<i>Imports.</i>	<i>Exports.</i>
Butter (tons) . . .	196	19,654
Cheese (tons) . . .	550	2·75
Eggs (number) . . .	50,030,500	55,137,148

Government Aid

The Government does a great deal to foster all branches of agriculture. Large sums are expended annually in the promotion of agriculture, including prizes for live-stock breeding, agricultural educational establishments, agricultural engineers, &c. There are also state funds for the purposes of loans to farmers for reclaiming and draining land. Government credit banks exist throughout the country and there are numerous agricultural schools, dairy and other instructors, seed-testing stations and an agricultural experiment station at Stockholm.

OTHER FOOD IMPORTS AND EXPORTS, 1913

	<i>Imports.</i> met. tons.	<i>Exports.</i> met. tons.
Rice and sago . . .	11,740	2,328
Sugar and syrup, etc. . .	12,591	1
Fruits . . .	20,189	3,214

FORESTRY

Forests of Norway

The forests of Norway, which are mainly Scots pine and spruce, cover an area of about 28,000 sq. miles, which is about 22 per cent. of the total area of the country. The principal forests lie in the south-east, where they cover 15,400 sq. miles.

The western and coastal districts are devoid of forests of commercial importance except around Trondhjemfjord and Namsenfjord where there are spruce forests of 3,700 sq. miles, prolonged northwards in inland valleys to beyond lat. 67° N. These northward extensions cover another 1,000 sq. miles. The third important forest area in Norway is in Finmark, where the spruce or fir forests extend northward in the valleys of the Alten, Tana, and Pasvik. In the past the forest area of Norway was considerably greater than now, but has been reduced by increased demand for timber and reckless cutting. The existence of so many forests to-day is due to their distance from centres of demand, the difficulties of transport and the high cost of freight rather than to any policy for the conservation of the forest wealth. About half the country is obliged to buy timber for its own use, and only about one-quarter has a surplus for export. Restrictions on cutting are now imposed. Since 1892 no export has been allowed from the provinces of Nordland, Tromsö, and Finmark, and since 1893 local governments throughout Norway have had powers over forests within their districts when necessary. There is a state forest department, and measures have been taken to replant devastated areas. Forest planting is a subject of instruction in all schools. Most of the forests are privately owned. The State owns about 4,000 sq. miles of forest, mainly in the north, and is increasing its holdings by purchase.

Forests of Sweden

The forests of Sweden are much more extensive than those of Norway, largely owing to the general lower altitude of the country. They cover about 86,300 sq. miles, which is about half the total area of Sweden, a higher proportion than any other country in Europe except Finland. Two-thirds of the forests, and most of commercial importance, are in Svealand and southern Norrland, but it is only in the extreme south and in the alpine zone of the highlands that forests are few or absent. They merge into the forests of south-east Norway on the one hand and the forests of Finland on the other. Exploitation for a long time has exceeded growth, and forest fires, especially in Norrland, have wrought great havoc. The consumption of timber is always on the increase, but afforestation and a rational system of forestry are tending to prevent the destruction of forests. It is doubtful, however, if new forest growth will keep pace with the felling unless more drastic methods are introduced, as the demand for timber and pulp-wood grows and its price rises. The utilization of waterfalls for the production of electric power will help by diminishing the amount of timber used as fuel.

In 1913 the area of public forests was about 20,000 sq. miles and of private forests about 66,000 sq. miles. More accurate statistics are difficult to obtain, since barren land beyond the limits of tree growth is included in the official figures. In the above estimates, however, it is excluded. Most of the public forests belong to the state, and small proportions to parishes, hundreds, and towns. During the last half-century the State has been increasing its holdings. There is a great deal of legislation in Sweden concerning forests, particularly in the north. A 'dimension' restriction is in force for the coast districts of Västerbotten and Norrbotten, where it is forbidden to cut pine or spruce which at a height of $15\frac{1}{2}$ ft. from the base has a less diameter than $8\frac{1}{2}$ in., bark excluded. Forests in Jämtland, Västernorrland, Kopparberg, and Gotland necessary for protection against the lowering of the

tree limit or against drifting sand are reserved. In no forests may lumbering be carried on in such a way as to prevent the natural regrowth of the timber. Forest plantations are numerous throughout the country. The state maintains a forest service to look after the forests, a forestry experimental department for the scientific investigation of forestry problems, and several schools of forestry.

Lumbering and Saw-mills

Felling begins in September or October, when the foresters migrate to temporary encampments. A hard winter with sufficient snow favours the industry, as it facilitates the haulage of the logs to the river banks. In summer the logs are floated down to saw-mills, pulp-mills, and seaports. In Norway the chief river used for floating is the Glommen: in Sweden the industry is more widely distributed, but the Ångermanälf is very important. There are altogether about 10,000 miles of floating ways in Sweden, and no timber district is unexploitable on account of want of floating ways. From the Torneå to the Dalälf 61 'floating' rivers run into the Gulf of Bothnia. On canalized rivers or canals the timber is made into rafts. Dams are often built to regulate the flow of the rivers, and wooden timber shoots are frequently constructed at waterfalls. The presence of lakes on the river courses is some impediment to the passage of the timber as it necessitates towage, but on the other hand its regulating effect on the flow of water is useful. It is important to convey the timber downstream as quickly as possible, to prevent its splitting or getting waterlogged. On the other hand 'floated' timber is held to have advantages over unfloated timber which has been conveyed by road and rail. British importers prefer the former, and maintain that the water has freed it from sap and resin and made it easier to work. In Germany and Denmark it is considered that unfloated timber is more durable. The skärgård along the coast of Sweden facilitates the export of timber as it affords sheltered anchorages at the river mouths, although ice prevents the traffic for six months

in the year. Owing to the shortage of shipping during the war the experiment was successfully tried of exporting timber in the form of rafts. A large float containing 500,000 logs was towed from the Gulf of Bothnia to Copenhagen in the summer of 1918. It is even proposed to try this method for export to British ports.

Most of the large saw-mills are on the coast, as it cheapens the timber to avoid the carriage of the sawn wood by rail. But at the same time coast saw-mills can seldom be worked by water-power, so fuel is required. The saw-mills of Sweden are chiefly in Svealand, those of Norway in the south-east of the country. The wood is cut into deals, battens, and boards for export. The waste ends are used for fuel, exported for firewood or cut up for small packing-case timber. Round or unsawn timber, known in the trade as Dutch barks, is also exported, but in decreasing quantities. This trade is more important in Norway than in Sweden, but it is bound to decrease as the supply of old trees needed for barks diminishes. The export of pit props is growing. It is most destructive to forests when it causes the felling of immature trees, but could be beneficial were the industry confined to undersized trees arrested in development. The pit-prop trade belongs to both Norway and Sweden. Railway sleepers, staves and laths are other products of the timber industry. The export of pulp wood cut from spruce and the manufacture of chemical wood-pulp (cellulose) is an aspect of the timber industry of growing importance (see pp. 182, 192).

Charcoal and Tar

Among the by-products of forestry is the manufacture of charcoal. In Sweden the waste timber of the saw-mills supplies the raw material, but it is also made in kilns and charcoal heaps in many parts of the Svealand forests and elsewhere. The winter snow facilitates its cheap transport by sledge. In 1912 there were 407 charcoal works on a large scale in Sweden. The manufacture of tar on a large scale is important in the north of Sweden. Umeå is the

chief port for tar. The manufacture of potash in 1913 was almost extinct in Sweden. Birch and spruce barks are used for tanning. For manufactures connected with timber, see Chap. X.

Timber Production

The figures for the annual production of timber are difficult to get, as there are only rough estimates of the amount used at home. In 1913 the amount of unwrought, hewn and sawn timber exported from Sweden was 6,123,590 cubic metres; for Norway the corresponding figures were 1,044,326 cubic metres. In addition to this Sweden exported about 875,000 cubic metres of more or less wrought timber. These totals in each case represent only about one-fifth of the total production, four-fifths of which are used at home for building, mining, fuel, and wood-pulp. On this estimate the total production of timber in 1913 in Sweden was 38,300,000 cubic metres, and in Norway 5,200,000 cubic metres. The Swedish State forests in 1914 produced about 4,000,000 cubic metres of timber.

The timber exports in Norway show a slow but steady decline; in Sweden they are almost stationary, but in both countries the export of worked timber, chiefly pulp, has increased.

Timber is also imported to Scandinavia in small quantities. Most of it comes from Finland and includes aspen for match-making (see pp. 183, 193). For import and export values, see Chap. XI.

CHAPTER VIII

FISHING AND HUNTING

Sea-fisheries—Freshwater fisheries—Fishery statistics—Fishery administration—Whaling—Hunting—Arctic hunting.

SEA-FISHERIES

FISHING is the oldest and most important form of livelihood in Norway. The long coast-line towards the waters of the Atlantic, with its endless indentations, has not only caused most of the population to live near the sea, but, in virtue of the relatively poor productivity of the country, has made the inhabitants turn to the sea for their food. In Sweden fishing has never had the same importance, except on the coasts of the Kattegat and the Sound, for the Baltic waters are poor in fish.

Along the coast of Norway deep water comes near in shore, so that the fishing-banks, frequented by such 'round' fish as the cod, whiting, and haddock, are near to the coast, but the waters are too deep and the bottom too rocky for flat-fish. The inner parts of the fjords are poor fishing-grounds. In addition there is the capture of migratory fish, such as the herring and mackerel, which at certain seasons frequent the coastal waters. The proximity of rich fishing-grounds to the coast of Norway is probably the reason why few Norwegians compete with other fishermen in the North Sea, Icelandic, and Atlantic fishing-grounds. The whale fisheries are an exception, for Norwegian whalers visit Jan Mayen, Iceland, and Spitsbergen, and go even farther to the south Atlantic and the Indian Ocean. On the representations of the fishermen, who complained that whaling destroyed the fish in coastal waters, whaling was prohibited in 1904 for 10 years on Norwegian coasts (see p. 159). Swedish fishermen seldom go far beyond Swedish waters, except to the fisheries off the coasts of Norway or the

mackerel fishery in the North Sea. They catch flounders, herrings, and eels principally in the Baltic, and turbot, halibut, soles, and dabs on the west coast. Of the Norwegian fisheries 80 per cent. are on the northern coasts, and the largest fisheries, which are seasonal, although carried on for many centuries, show no sign of exhaustion. In 1915 the total catch of the Norwegian fisheries was 542,087 metric tons valued at about £4,700,000. The Swedish fisheries, especially the herring fishery, have been increasing in importance in recent years.

The *cod fishery* is mainly confined to Norway, where it has assumed great importance. The cod is, however, fished off the west coast of Sweden and as far into the Baltic as Gotland, for it is one of the few marine species which enters the Baltic. From January to April, when the cod migrate towards the shore to spawn, is the principal fishing season. These cod are known as sea-cod, *torsk*, or *skrei*. The centre of the fisheries is the Lofoten Islands. Early in January about 35,000 boats and 16,000 to 30,000 fishermen, including Lapps, arrive at the Lofotens from Nordland, Tromsö, and Finmark. There is little daylight in that latitude (68° N.) in January, but the midwinter climate is mild though stormy. The fishing-banks, of which there are about 36, lie 8 to 10 miles from the shore in Vestfjord in 30 to 110 fathoms. The fishing-boats are undecked and of two sizes. Boats of 7 to 8 tons, with 10 oars and 6 to 8 men, fish with nets 27–33 yds. long, and 3 to 3½ mesh, which are set at night and drawn up in the morning. Smaller boats of 3 tons, with 8 oars and 4 to 5 men, fish with lines 1,600–2,700 yds. long armed with 1,200–1,400 hooks, set by day or night. Still smaller boats of one ton and a crew of 2 or 3 men fish with hand-lines. A catch of 300–400 cod for a net boat and 200 for a line boat is considered a good day's work. The average take for one man is about 1,000 cod in the season, and his profit about 1½ kr. (about 1s. 8d.) a day. In recent years the returns have been relatively poor: in 1912 the total catch was 15,000,000 cod, and in 1913 only 10,000,000, in 1915 it was 16,000,000. Ashore the

fish is split open, gutted, and dried. *Stöckfish*, or *törfsk*, is dried only, while *klipfsk* is salted also. About three-quarters of the catch are made into klipfsk. By June the process is complete. The head and entrails are made into fish guano, the livers are used for cod-liver oil, and the roes are salted and sent to France as bait for the sardine fisheries. The stockfish and klipfsk are sent to Bergen and Trondhjem for export. A fungus does considerable damage to the drying fish and its attacks have not been satisfactorily met. In the Romsdal district there is a cod fishery at the same time of year, but it is on a smaller scale, employing some 13,000 men and 2,500 boats; but in 1914 it produced over 18,000,000 cod, and in 1915 over 14,000,000. The other cod fishery is the so-called *capelan lodde*, or *fishery*, from February to May, on the coasts of Finmark. At that season the cod follow a kind of salmon, the capelan, as it comes inshore to spawn. The fishery, which attracts some 30,000 men, is carried on with baited lines from 10-oared boats, each with a crew of 5 men. Many of the fishermen come from the Lofotens at the close of this fishery there. The fish are treated as at the Lofotens. The fishery has lately developed to such an extent that it is as good as or better than the Lofoten fishery. In 1913 the total catch was 36,000,000 cod and 1914 over 23,000,000, later 1915 only 16,000,000. During the war the spring cod fishery had less success due partly to the difficulties on account of mines and mine fields and partly owing to the loss of fishing-boats. The 1917 catch was under 7,000,000 cod.

The *herring fishery* is the chief fishery in Sweden, and next in importance to that of the cod in Norway, but it is a variable fishery and in some years is almost a failure. The common herring enters the Baltic, which has also a small variety peculiar to its waters. Except from the point of view of size, there is little to choose between the two kinds. The common herring is migratory and comes into shallow water to deposit its spawn on the sea-bottom in spring. At that season is the spring fishing on the coasts of the Stavanger and Bergen amts. Stavanger and Haugesund are its head-quarters. It is also

fished in the southern Baltic. In the summer and autumn, when the herring again approach the coast in search of food, are the summer fisheries of the so-called fat herring. These are the most profitable, for the fat herring are best for salting. The summer fisheries occur all along the coasts, but particularly in Nordland and Tromsö. Boats from Skåne and Blekinge provinces in Sweden fish in the Kattegat, the Sound, the southern Baltic, and around Gotland. In Nordland and Romsdal waters, in Norway, there is also an important fishery later in the year, called the large herring fishery, which employs some 20,000 men in November and December.

The Baltic herring is fished in spring and summer on the coasts of Blekinge and northward along the coasts of Nordland. It is caught through holes in the winter ice in some places. Nearly all herring fishing is done from small boats in inshore waters. Seine nets, 800 ft. long and 100–130 ft. deep, are used in the larger fisheries. They are buoyed by glass balls, corks, or kegs. On the Nordland coast there is a peculiar 'hook net', which is a sort of seine tied deep and turned inwards in the shape of a hook. Trawlers have been used in recent years with some success in deeper waters.

Norwegian herrings are generally salted for export from Bergen, Haugesund, Trondhjem, and Stavanger. Swedish herrings are often exported fresh to German curing houses, but the best are first salted. In good herring seasons the poorest fish in the Bohuslän fisheries are used for fish guano and herring oil.

The *mackerel fishery* is in the Skagerak, Kattegat, and the North Sea. It begins in the coastal waters in early summer and later moves to the North Sea. The mackerel is rare north of Trondhjem and it does not occur in the Baltic. Baited lines or seine nets are used, and half the boats come from Norway and half from Sweden. In Sweden the mackerel fishery ranks next to the herring fishery in importance. Most of the mackerel is salted for export, but some is sent abroad in ice.

The *eel fishery* is important in Sweden. The eels are caught

off the Baltic coasts of Småland on their autumn migration to the Atlantic. Eel traps called 'hommor' are used, as well as large pound-nets called 'ålbottengarn'. The eels are exported fresh to Germany in German vessels which visit the eel-fishing centres. Eel-fishing is little pursued in Norway.

The *sardine fisheries* of Stavanger are really fisheries of brisling or sprats and small immature herrings, for the true sardine or pilchard, a species of herring, does not occur in northern waters. Norwegian 'sardines' are now known in commerce as 'sild'.

FRESHWATER FISHERIES

The *salmon fisheries* are principally river fisheries, but many of the west coast rivers of Norway are inaccessible to salmon. The best rivers in Norway are leased to British subjects. In some rivers, however, there is commercial fishing with seine nets at the mouth. In the Trondhjem and Bergen districts salmon are fished along the coasts from May to August. Most of the catch is exported fresh. Sweden has about forty salmon rivers and there is also a kind of salmon or salmon-trout in the great lakes. The fish are caught by nets, seines, and traps, but they are gradually removing to the river-mouths and coasts.

Coarse fishes, pike, perch, bass, bream, ide, roach, &c., are important in the Swedish lakes, and char, trout, gwyniad, grayling, and vendace, especially in the north. These species are mostly found in the Baltic as well as in some of the Norwegian lakes.

FISHERY STATISTICS

PRODUCT OF NORWEGIAN FISHERIES, 1914-15

	1914.	1915.
Cod, &c. (metric tons)	269,052	235,768
Herring (hectolitres)	2,833,382	2,700,090
Bristling (hectolitres)	98,497	160,705
Mackerel (numbers)	174,223	301,722
Salmon and trout (metric tons) . .	764	783
Lobsters, &c. (numbers)	7,201	8,311
Other fish (metric tons)	9,279	9,033
Total { Weight (metric tons)	585,590	542,087
{ Value (Kroner)	59,629,731	84,896,544

PRODUCT OF SWEDISH FISHERIES, 1914 (metric tons)

<i>Cod, &c.</i>	<i>Herring.</i>	<i>Brisling.</i>	<i>Mackerel.</i>	<i>Salmon & trout.</i>	<i>Lobsters, &c.</i>	<i>Others.</i>	<i>Value. Kronor.</i>
6,650	82,335	735	7,378	537	334	14,366	20,235,125

NORWEGIAN EXPORTS AND IMPORTS OF FISH, 1914 (metric tons)

	<i>Exports.</i>			<i>Imports.</i>	
	<i>Fresh.</i>	<i>Dried.</i>	<i>Salted and smoked, &c.</i>	<i>Fresh.</i>	<i>Salted and Dried.</i>
Weight (metric tons)	80,089	21,510	185,356	3,813	12,750
Value (kroner)	16,479,100	15,810,300	54,078,400	1,144,000	3,878,700

SWEDISH EXPORTS AND IMPORTS OF FISH, 1914 (metric tons)

	<i>Exports.</i>		<i>Imports.</i>	
	<i>Fresh</i>	<i>Salted, &c.</i>	<i>Fresh</i>	<i>Salted, &c.</i>
Weight (metric tons)	45,072	9,997	7,145	48,381
Value (kronor)	7,572,553	3,099,067	2,413,315	12,254,028

(For statistics of tinned fish see Chapter X.)

FISHING BOATS, 1914

		<i>Without motors.</i>	<i>With motors.</i>	<i>Steamers.</i>	<i>Sailing.</i>
Norway	.	54,683	7,408	210	1,986
Sweden	{ sea	14,251	2,082	No figures	
	{ great lakes	1,790	120	"	"

FISHERY ADMINISTRATION

The three-mile limit of territorial waters common to Sweden and other countries is extended in Norway to a four-mile limit drawn from the outermost islands and rocks along the coast. In the great fjords such as Vestfjord and Varangerfjord Norwegians maintain the sole right of fishing, irrespective of the four-mile limit, basing their claim on usage of at least 1,000 years. Shore-ownership of land in Norway includes the right of fishing with fixed appliances, and sometimes a share of the profits obtained by the use of movable appliances, nets, lines, &c. In Sweden shore-ownership extends 196 yds. (180 metres) from the 1-fathom (2 metre) line. In Sweden it is enacted that in rivers and sounds one-third of the water-

course in its deepest place shall be left free from fishing appliances, unless special privileges are granted.

In both countries the care of the fisheries is in the charge of state departments, but the state owns very few fisheries. There are state biological stations to investigate fishery problems at Motala in Sweden, and at Dröbak, Bergen and Trondhjem in Norway. In Sweden there are a number of fish-culture stations for the breeding of salmon, carp, tench, and American brook trout and rainbow trout. In both countries state grants are made to promote fisheries and loans to provide boats, gear, and fishing harbours. In 1885 a Swedish state fishery agency was established in London to further the export of Swedish fish, but in 1888 it was transferred to Berlin.

Both Norway and Sweden maintain special vessels to protect and investigate fisheries, and both countries take their share in the International North Sea Fishery Commission.

WHALING

The hunting of whales on a large scale on the Norwegian coast is of modern origin. Until the invention of the explosive harpoon about 1866 it was scarcely practical to hunt finners or even humpbacks, for the finner is not only very quick in its movements and stays only a few moments on the surface, but, unlike other whales, sinks when killed. But after that date finner fishing began. By 1885 the Norwegians had 30 vessels engaged in the fishery off the coast of Finmark and the fishery gradually extended to Iceland, the Faroes and Shetlands, and revived long extinct fisheries in Spitsbergen. Modern whalers are iron vessels 100–115 ft. long, with a speed of 11 to 12 knots. The old-fashioned wooden whaler is practically extinct. Fishermen on the coasts soon began to complain of the effect of whaling on the cod fisheries. Their contention was that as whales feed on the capelan which pursues the cod inshore the destruction of whales had the effect of reducing the number of cod. A few bad cod-seasons

strengthened this belief, although investigation proved that the blue whale at least does not feed on capelan even if the smaller rorquals do. In 1880 a ten-year prohibition was instituted against whaling within one mile of the coast from January 1 to May 31. The agitation against whaling continued and grew intense after a very bad cod-season, whatever may have been the causes of the failure. In 1890 a commission appointed to inquire into the relation between fisheries and whaling came to the conclusion that whale protection was not necessary in the interests of the fisheries. The law of 1880, however, was re-enacted in 1896, but the fishermen were still dissatisfied and demanded the total prohibition of whaling. Another contention of theirs was that the movements of seals, to which they attributed the failure of the Finmark cod-fishing in 1898, were due to the absence of whales. In 1903 the fishermen attacked and destroyed the whaling station of Mehavn, east of the North Cape, and next year a law was passed prohibiting whaling in the territorial waters of Nordland, Tromsø, and Finmark for a period of ten years. This prohibition has remained in force. The effect of this law was to drive the whalers to other seas where their whaling stations are not so far removed from the whaling grounds. For some years there were several stations in Spitsbergen, but that fishing failed in 1912 and was abandoned in 1914. There are Norwegian stations, chiefly relying on finner whales, in Iceland, the Faroe Islands, the Shetlands, the Hebrides, and Ireland. However, the principal Norwegian whaling grounds are now in the South Atlantic where large captures are made annually of blue whales, finners, hump-backs, and southern right whales. Sperm whales rarely occur south of lat. 50° S. The stations are on the British possessions of South Georgia, the South Orkneys, and South Shetlands and bring a large revenue in licences and rents to the Falkland Islands. There are also Scottish and South American whalers in these seas. Norwegian whalers also work off West Africa, East Africa, Brazil, Chile, Mexico, Australia, New Zealand, and Alaska. Sperm

whaling in the Seychelles failed, chiefly for reasons connected with the war. The chief Norwegian whaling ports are Tönsberg, Sandefjord, Haugesund, Larvik, and Kristiania.

The total catch from the northern whaling areas including Shetlands, Hebrides, Ireland, the Faroes, and Iceland in 1913 was 19,122 barrels of oil and 20,367 bags of guano and an unspecified amount of whalebone. This return was obtained from over 850 whales of different kinds. The South Atlantic whaling in the same year gave Norway a return of 405,800 barrels of oil. A decline is noticeable in the figures of the northern area compared with previous years, but a steady increase, which is still maintained, in the southern areas.

In 1916 the total Norwegian production of whale oil in all seas was 367,000 barrels of which 332,600 barrels come from the South Atlantic. The Norwegian production was 58 per cent. of the world's total. In the same year the total Norwegian production of whale guano was about 100,000 bags. The total number of whaling vessels was 92, with 27 others engaged in transport and as factories. The tonnage engaged in whaling was 109,905 tons. This marked a considerable decrease from the years immediately preceding the war.

HUNTING

Hunting nowadays provides a livelihood for few people, although the elk, reindeer, and red-deer are all used for food as well as the hare, grouse, blackcock, capercaillie, ptarmigan, partridge, wild duck, and other game birds. In Norway the willow-grouse is the most important game-bird and over a million of them are shot annually. The birch woods are the best grouse country and many peasants shoot grouse, which are sent to market in the towns of the south. In Sweden quantities of game are trapped in Lapland and Jämtland for export to Stockholm and other cities. Undoubtedly Scandinavia has enormous quantities of game suitable for food, and under the game laws now in force and with the destruction of vermin these resources are not diminishing but even increasing.

The kittiwake, puffin, and guillemot are hunted on the sea-coasts partly as food and partly for their feathers. In their enormous numbers these and allied birds constitute a most important supply of food. The eggs are also collected in large numbers. The eider-duck, which is abundant on many islands north of the Arctic Circle, is valuable for the down of the female.

There is little fur-hunting in Scandinavia, but the ermine and the Arctic fox are valuable and the reindeer skin less so. The skins of old reindeer are useless as they invariably shed their hair when cured. The wolf, lynx, glutton, and common seal are hunted for the sake of the head-bounty.

ARCTIC HUNTING

Large numbers of hunters leave Tromsø, Hammerfest, and Vardö every summer for Arctic hunting-grounds. Some of them hunt walrus in the waters of Novaya Zemlya, but the majority go to Spitsbergen to remain for the winter, the sloops returning to Norway and fetching them next summer. The Spitsbergen hunters trap polar bears, Arctic and blue foxes, shoot reindeer, and collect eider-down. The occupation is essentially a winter one because the summer skins of foxes are of no value and the bear is a winter visitor to Spitsbergen. The hunters live in shanties along the west coast, and a few on the east coast, but ice often prevents access to the east. In 1909-10 there were about 200 Norwegian hunters in Spitsbergen. The occupation, though arduous, used to be most lucrative, for game was plentiful and the price of skins had a steady upward tendency, but it has been overdone. In place of shooting and trapping resort was had to poisoned bait to kill bears and foxes, despite the steps taken by the Norwegian Government to prevent its sale to hunters. These methods and hunting by the miners in Spitsbergen have depleted the game on the west coast, but there is still much on the east and north. In the winter of 1917-18 a small party of Norwegian hunters secured a large number of foxes at Jan Mayen.

This Arctic hunting, two centuries ago, was entirely in the hands of Russians who originated it, but they long ago withdrew from Spitsbergen.

From Tönsberg and Sandefjord sealers go in small numbers to Jan Mayen and east Greenland. A few sloops go from northern ports to Spitsbergen to hunt white whales in summer.

CHAPTER IX

MINING AND QUARRYING

Introduction—Norwegian mining—Swedish mining—Quarrying.

INTRODUCTION

THE old rocks of the Scandinavian peninsula are rich in metallic ores and other minerals except coal, which is very poorly represented. Norway has her share of useful ores but the Norwegian mining industry, although growing, is still not of great dimensions and is pursued under considerable difficulties of transport owing to the mountainous nature of the country.

In Sweden on the other hand mining has occupied a foremost place for centuries and is still the most important occupation. The Swedish iron and steel industries, based on rich and easily accessible deposits of ore, have long been famous. But Sweden's poverty in coal has led to her becoming a great exporter of ores, and concentrating on the manufacture of high grade and relatively costly iron, steel, and other more valuable metals.

While the total ore production of Norway in 1913 was estimated at about 1,000,000 tons that of Sweden in the same year was about 8,000,000 tons. The Swedish output greatly increased during the war.

NORWEGIAN MINING

Coal.—The only coal deposit in Norway is in Andö, one of the islands of the Vesteraalen group. It is a low form of lignite of little or no value. Consequently Norway has to import all her coal, chiefly from Great Britain, and coke from Germany. Sweden has too little coal of her own to have any surplus for export to Norway. For many years

Norway has been casting anxious eyes on the rich deposits of coal in the unclaimed Spitsbergen archipelago, but until 1915 her mining claims there were of little value and provided her with no coal. Coal was, however, sent in small quantities to Norway from an American coal mine in Advent Bay, Spitsbergen. It is of good quality and met with a ready demand in Tromsø, Hammerfest, Narvik, and other northern ports, where it was preferred to Newcastle coal. In 1911 Spitsbergen sent about 25,000 tons to Norwegian ports and in 1912 about 45,000 tons. The small amount of the annual export was due to the mines not yet being in full working order. In 1915 a Norwegian syndicate bought the chief Spitsbergen coal mine from the Arctic Coal Company of Boston, U.S.A., and during the war endeavoured to increase the output and export especially in view of the restrictions placed on coal export from Great Britain to Norway. The cost of working Spitsbergen coal is increased by the difficulties of having to import all labour and food, the high rates of insurance on vessels, and the fact that colliers have to go to Spitsbergen in ballast so that the cargo of coal has to bear the cost of the double journey. On the other hand there are no taxes, mining dues, or harbour dues to be paid, as Spitsbergen is a no-man's land. Mining continues throughout the year but export is possible only from June to October. During the summer of 1918 about 60,000 tons of Spitsbergen coal reached Norway. A Norwegian company is exploiting the small deposit of coal on Bear Island, midway between northern Norway and Spitsbergen, but the loading facilities at Bear Island are poor and harbour construction would be costly.

In 1913 Norway's total import of coal was 2,486,896 tons, of which all but some 50,000 tons of Spitsbergen coal came from the United Kingdom. The chief coal ports are Kristiania, Bergen, Trondhjem, Drammen, and Sarpsborg.

Iron.—Iron-ores are widespread in occurrence but poor in percentage of iron. They have been worked for many centuries, but fifty or sixty years ago the rising price of

charcoal and the competition of higher grade ores in other countries resulted in many of the mines being closed. In recent years, however, there has been a revival in iron-mining chiefly due to the introduction of electric smelting, for which water power can be employed, and the use of magnetic separators to free the ores from 'gangue' and so produce a high grade concentrate for export. Most of the mines now use this process.

The best iron-ores occur in the south of the country and are mined at Langö near Kragerö, Klodeberg, and Kjenlid near Arendal and elsewhere in the vicinity. On an average they contain 43 per cent. of iron, and about 0.02 per cent. of phosphorus. There are larger deposits in Nisserdal, with 55 per cent. of iron and 1.75 per cent. of phosphorus, but they are inaccessible from present lines of communication and have never been worked. Other mines are at Ulefos on Nordsjön. Near Egersund on the south-west coast there is titaniferous iron-ore with 38 to 40 per cent. of iron. This ore is also mined at Rödsand in Nordmøre where the ore has about 45 per cent. of iron.

From Ranenfjord, a little south of the Arctic Circle, to Varangerfjord low grade ores occur all along the coast. In all cases they must be subjected to magnetic concentration. The deposits in Elsfjord, a southern branch of Ranenfjord, are small and average 25 per cent. of iron but can be made into concentrates with 70 per cent. of iron. A British company has mines in Dunderlandsdal at the head of Ranenfjord, fourteen miles above the port of Mo, to which there is a private mineral railway. The Dunderland ore contains about 11.5 per cent. of iron as magnetite, 25 per cent. of iron as hematite and about 0.3 per cent. as phosphorus. The concentrates produced contain about 68 per cent. of iron and 0.03 per cent. of phosphorus. It is estimated that the total ore body is about 80,000,000 tons. The same deposits have been traced from Saltenfjord to Sörfoldenfjord. On Ofotenfjord there are several deposits. Those on the south at Horfjeld consist mainly of magnetite and are said to be extensive but have

never been worked. On the north side are the Bogen deposits which are worked by a British company at Strand. The ore contains 20 per cent. of iron as magnetite, very little hematite, about 0.25 per cent. of phosphorus, and a good deal of sulphur. The concentrates contain 60 per cent. of iron. Near by at Liland the ores are rich in manganese. At Fagernes, east of Narvik, there is a great deal of fine grained ore with only 22 per cent. of iron and over 1 per cent. of phosphorus. At Lunkefjord in the Vesteraalen Islands and at Fölstad in the Lofotens there are small deposits of magnetic ore with about 50 to 56 per cent. of iron and 0.025 per cent. of phosphorus. German mines at Salangen on Vaagsfjord, with a large concentrating plant at Söveien, were closed in 1913 on account of the low grade of the ore, which contained only 17 per cent. of iron as magnetite and 5 per cent. as hematite. Opposite Tromsö there are ores with only 15 per cent. of iron as magnetite, 2 per cent. of iron as hematite, and 0.2 per cent. of phosphorus.

Finally there are the Sydvaranger deposits, which are the most extensive of any in Norway, and are estimated to contain 100,000,000 tons of ore. They are worked on Bög-fjord. The ore contains about 35 per cent. of iron as magnetite, very little hematite, and about 0.05 per cent. of phosphorus. Concentrates containing about 70 per cent. of iron are produced. The capital of this company is held mainly in Sweden and Germany. In 1913 about 70 per cent. of the output went to Germany and the rest to Great Britain. About 1,300 hands were employed.

The total production of iron-ore, chiefly concentrates, in Norway in 1914 was 652,273 tons, of which about 87 per cent. came from the Sydvaranger mines. In 1915 the total output was 714,917 tons.

Finally it should be noted that much of the Swedish iron-ore exports are shipped at Narvik in transit from Gällivara and other Lapland mines. In 1913 the Swedish ore in transit was about 3,000,000 tons.

Copper.—Both copper pyrites and cupriferous iron pyrites

are widespread in Norway and have been mined for several centuries. The utilization of water power to generate electricity has caused a revival of copper mining which until recent years had fallen off owing to fuel and transport difficulties. There is an export of both pyrites and metallic copper.

The oldest mines, still in working order, are at Røros in Guldal. They started in 1646. The ore contains about 5 per cent. of copper and is reduced by the Bessemer process to 99.5 per cent. metallic copper. The output for export used to be 600–700 tons of copper and 20,000 tons of pyrites a year, but in 1913 it was only 556 tons of copper and 12,000 tons of ore. The mines are owned by a Norwegian company which has a private railway line about 6 miles long to the main line at Tyvold. The Sulitjälma mines in Salten in Nordland were opened in 1887. In 1913 their output was 1,385 tons of copper and 125,000 tons of ore. A mineral line to the coast, 16 miles long, which was to be opened in June 1915, and the extension of the works, promised an export in 1916 of 2,000 tons of copper and 200,000 tons of ore.

Among other mines working in 1913 the following were important: Lökken in Meldal, the terminus of the railway from Thamshavn, with an output of 130,000 tons of pyrites; Foldal, a tributary of the Glommen, 65,000 tons; Röstvanger on Tinoset, 27,000 tons; Killingdal in Guldal, 24,400 tons; Bossmo, near Mo in Ranen, 20,000 tons; Rødfjeld, near Mo, 13,600 tons; the island of Stordö off Hardangerfjord, 22,200 tons; Viksnes on Karmö island near Haugesund, 7,500 tons; and Ytterö island in Trondhjemfjord. Birtavarre mine on Lygenfjord produced 450 tons of metallic copper in 1913. The Birtavarre mine is connected with Kjaafjord by a light railway 8 miles long.

Several mines have been more or less exhausted and closed, including those at Aamdal in Telemarken, at Meraker, at Böilestad near Arendal, and others. Ores in Undal in the south, north of Lindesnes, are rich but unprofitable to work on account of absence of export facilities.

New projects include mines near Ballangen on Ofotenfjord, at Folsteid in Vaagö in the Lofotens, and the Grong mines north-east of Namsos. The Grong Mining Company which is mainly a French concern was established in 1913 to work rich deposits of copper pyrites near the Swedish frontier at Skorovas near Tunnsjön, Gjersvik on Limingen and Joma near Huddingsvand. The ore are said to be of good quality and the total content of the field is estimated at 8,500,000 tons. Further deposits of pyrites almost certainly occur in the district. A railway is being built to Namsos. In 1918 the State was negotiating for the purchase of the properties of the company for 10,500,000 kr. It is proposed to extend the railway. The estimated annual output of the Grong mines is 200,000 tons of ore, but a large part of this is of value only for sulphur.

Copper is also produced in small quantities at the nickel refining works at Kristiansand and elsewhere, see *Nickel*.

In 1914 Norway's total production of copper ore was 57,951 tons and of copper-bearing sulphur pyrites 414,886 tons. The total export of both was 403,000 tons. The production of metallic copper was 2,741 tons. In 1915 the copper ore mined was 56,097 tons, and the copper-bearing pyrites 513,335 tons, while the output of metallic copper was 2,860 tons.

Zinc.—Zinc blende occurs in a few places and used to be mined at Birkeland near Sande on Sandefjord. Hadeland mine near Grua in Hakedal is said to yield rich ore. Most of the metallic zinc produced in Norway is made from imported ore, chiefly Australian and Greek, at electro-thermal works near Sarpsborg and on Trondhjemfjord. The production of zinc and lead ore in 1914 was 243 tons ; in 1915 it rose to 1,829 tons.

There is both import and export of zinc.

Chromium.—Chromite is found near Trondhjem and at Røros on the Glommen. The output of 81 tons in 1914 rose to 350 tons in 1915.

Nickel.—Magnetic pyrites containing 2 to 3 per cent. of

nickel is widely spread in Norway from the south of the country to Senjen, an island in the Tromsø amt, but since the reduction in the price of nickel consequent on the discoveries in Sudbury, Canada, few of the deposits have been worked. The most important mines are at Evje in Saetersdal, on Faeö island near Haugesund and at Ringerike near Tyrifjord.

In 1913 the Flaad mine at Evje produced 28,500 tons of ore which with about 2,000 tons from the Faeö mine were converted at the Evje smelting works into nickel stone. The same course was pursued at the Ringerike smelting works with 13,000 tons of ore from the Ertelier mine. The nickel stone was afterwards sent to the nickel refining works at Kristiansand which since 1910 have refined both Norwegian and imported ore, the latter from Greece and New Caledonia. The Kristiansand works in 1914 had an output of 689 tons of metallic nickel. In 1915 the production had risen to 793 tons. The works are said to be capable of producing 1,200 tons a year. The nickel ore mined in Norway was 48,529 tons in 1914 and 77,018 tons in 1915.

Cobalt was mined by a German company until 1898 at Modum west of Vikesund on Tyrifjord.

Silver and Gold.—At the Kongsberg silver mines, owned by the State, metallic silver occurs in many rich lodes ; large nuggets are frequently found. The mines have been worked since 1694 ; in 1898 they were producing about 5 tons a year but the fall in the price of silver affected their prosperity. New veins have recently been discovered and in 1912–13 the output of the Kongsberg mines was about $7\frac{1}{2}$ tons of metallic silver and a small quantity of silver ore. Silver is also worked in Sveningdal on Vefsenfjord in Nordland but the output is small. In 1913 a German company was working on the old mine of Vinören north of Kongsberg. Norway produced 7,372 tons of silver and silver ores in 1914 and 8,431 tons in 1915. Fine silver rose from 9 tons in 1914 to 13 tons in 1915.

There seems to be no gold mining in Norway.

Lead.—Galaena occurs in the Konnerud or Jarlsberg mines at Skoger near Drammen but does not seem to be worked.

Titanium ores are now being dug and used in the manufacture of dyes and pigments at Fredrikstad. The ore is rutile (nearly pure titanium dioxide) and the most important deposits are near Kragerö. The output was 77 tons in 1914 and only 30 in 1915. For titaniferous iron ores see under *Iron*.

Molybdenum.—Molybdenite occurs in the south-west, the richest deposits being about Fjotland. At Knaben it is mined by a British company. Molybdenite mines have recently been started at Mandal. Wulfenite, another ore of molybdenum, has been mined near Egersund. Norway's total production of molybdenum ores in 1914 was 12 tons and in 1915 was 83 tons.

SWEDISH MINING

Coal occurs only in Skåne in several seams each 5 ft. thick but containing only 1 ft. to 6 in. thickness of coal; only two of these seams are worth mining. The coal is not of great calorific value and has a high proportion of ash. Of the total deposits, estimated at 300,000,000 tons about half have 13 per cent. of ash and the rest a percentage varying from 14 to 55. There are coal mines at Höganäs, Billesholm, Bjar, Skromberga, Ormastorp, and Hyllinge. In 1913 the total output of the Skåne coalfields was 363,965 tons. In 1912 when the total home production was 360,000 tons there was an import of 4,774,000 tons, most of which came from Great Britain. In 1914 Sweden produced 414,825 tons. Valuable coal deposits have recently been reported in Blekinge. In recent years a Swedish company has been mining coal in Spitsbergen. A few small cargoes have reached Sweden and the company hoped in 1918 to send 50,000 tons, but had difficulties in finding the requisite shipping. In 1919 an export of 100,000 tons is promised.

Iron.—Sweden is rich in iron ores which constitute her chief source of wealth. They occur principally in two regions,

central Sweden and Lapland. In central Sweden the ore-fields cover about 5,800 sq. miles chiefly in west and north Västmanland, and adjacent parts of east Värmland and south Dalarne. In this area the most important mines are at Grängesberg and others are at Norberg, Riddarhyttan, Stripa, Stråssa, Striberg, Dalkarlsberg, Persberg, and Finnmossen. Other important mines in central Sweden beyond this area are those at Dannemora in north Uppland, at Kantorp in Södermanland and in Östergötland. In southern Sweden there is an important deposit of iron-ore at Taberg in Småland. The Lapland or Norrbotten deposits lie between lat. 67° and 68° N. and long. 19° and 22° E. and cover about 3,000 sq. miles. They are the most valuable deposits in Sweden and include the mines of Kirunavara and Gällivara. The deposits at Tuolluvara, Luossavara, Svappavara, Leveäniemi, Ekströmsberg, and Mertainen have not yet been worked. Outside this area in northern Sweden the only ore-field of importance is that of Ruotevara in lat. 67° N., long. $17^{\circ} 35'$ E. ; it has not yet been worked.

As a rule the ore deposits are rarely isolated and several ore stocks occur close to one another forming extensive fields.

The ores of central Sweden are both magnetite and haematite, all with little phosphorus except a few such as Grangesberg which have 1 per cent. In Lapland the ore is chiefly magnetite with 1 to 3 per cent. of phosphorus, but ores low in phosphorus occur also at Gällivara, Kirunavara, Tuolluvara, Leveäniemi, and Mertainen. The Dannemora and Persberg ores have 0.01 to 0.001 per cent. of phosphorus. There are deposits of haematite at Gällivara, Svappavara, and Ekströmsberg. Magnetite rich in titanium occurs at Ruotevara in Lapland and at Taberg in southern Sweden.

In addition to these ores, lake and bog ores of impure hydrates and carbonates occur extensively. They used to be important but are now little used. In 1913 the total output of lake and bog ores was only 3,822 tons.

The average percentage of iron in Swedish ores is 60 per cent. compared with 36.7 per cent. for the rest of Europe and

44.5 per cent. for the whole world. The Lapland ores have an average of 65 per cent. of iron. Since 1898 low grade ores with 25 to 50 per cent. of iron have been utilized in the manufacture of concentrates with 60 to 70 per cent. of iron. The concentrate is compressed into briquettes to give it a more suitable form for transport and for use in blast furnaces.

The total supplies of iron ore (in tons) available in Sweden are estimated as follows :

	<i>Lump ore.</i>	<i>Concentrating ore.</i>	<i>Equivalent concentrate.</i>	<i>Total of lump ore and concentrate.</i>
Central Sweden .	90,200,000	53,600,000	32,100,000	122,300,000
Central Sweden, little known .	40,000,000	—	—	40,000,000
Taberg .	—	50,000,000	15,000,000	15,000,000
Lapland, worked .	1,035,000,000	—	—	1,035,000,000
Lapland, unworked .	115,000,000	—	—	115,000,000
Ruontevara .	—	—	8,000,000	8,000,000
Total .	—	—	—	1,335,300,000

This total of ore corresponds to about 845,000,000 tons of iron. The output of ore has been steadily increasing during recent years and in 1913 was 7,475,571 tons including lump ore and concentrate. Two thirds of the total amount came from Lapland. Sweden is thus responsible for about 4 to 5 per cent. of the world's annual output of iron ore. In 1916 the output was 6,986,000 tons. Export of iron ore only began on a large scale about 1887 and from the Gällivara deposits only in 1892. With the opening of the Lapland railway in 1902 the figures rose enormously and have continued to mount steadily ever since. In 1913 the export of iron ore from the whole of Sweden was 6,439,750 tons or about 86 per cent. of the total output. Of this amount Germany took nearly 5,000,000 tons, Great Britain about 670,000 tons, France about 38,000 tons, America 361,000 tons, and other countries between them about 158,000 tons. In 1916 the total export of iron-ore was 5,540,000 tons.

The production of pig-iron was 730,257 tons in 1913 and 760,701 tons in 1915.

Copper.—In the seventeenth century Sweden was the

largest producer of copper in the world. In 1655 Sweden with a production of 3,453 tons could supply the world's demand. During the last century or two, however, the relative importance of the industry has decreased in comparison with other countries although the actual production of copper has increased in amount.

Copper ores occur at Falun, Garpenberg in south Dalarne, Tunaberg in Södermanland, Bersbo in Östergötland, Årskutan in Jämtland, and elsewhere, but the Falun mine was the only one of these working in 1913. This mine dates from the thirteenth century. The ore is copper pyrites with 2 to 3 per cent. of copper. In 1918 a new copper mine was started at Vittensten in Vestre Värmland. Since 1894 all the ore extracted at the Falun mine has been used in the manufacture of vitriol, and only imported ore, mainly from Norway, has been used in the manufacture of metallic copper. At Hälsingborg since 1902 copper has been extracted from copper pyrites imported from Sulitjälma in Norway for the manufacture of sulphuric acid, and from local copper ore. In 1918 a new copper mine was opened at Kvittensten in Värmland. In 1913 the amount of copper ore, including concentrates, raised in Sweden was 5,458 tons and the amount of metallic copper made from Swedish ores was 4,215 tons, and from imported ores 1,206 tons. The total import of metallic copper was 9,181 tons and the export 1,287 tons. In 1916 the output of copper ore rose to 13,895 tons, but the total production of copper was only 3,180 tons.

Zinc.—There is a good deal of zinc blende in Sweden but the difficulty in manufacturing metallic zinc is the absence of cheap fuel. This has been partly overcome by the use of electric power. Most Swedish zinc ore comes from the Åmmeberg mine near the north end of Lake Vättern, owned by a Belgian company, at least until 1913. Other mines are of small importance. The total Swedish output of zinc ore, including concentrates, was 50,752 tons in 1913 and 60,700 in 1916. At the Trollhättan electro-thermal works 6,851 tons of metallic zinc were produced in 1913. This zinc contains

99.95 per cent. of metal. The import and export of zinc in 1913 were each about 6,000 tons. The total production of metallic zinc in 1916 was 9,997 tons.

Nickel.—Nickel ore used to be mined at Sågmyra near Falun and at Klefva near Hvetlanda, and there are other deposits at Frustuna in Södermanland, Haddebo near the north end of Lake Vättern, and Ruda south-west of Oskarshamn. The discovery of nickel at Sudbury, Canada, some 30 years ago reduced the price of nickel to such an extent that the mines in Sweden closed down. The ore is chiefly low grade magnetic pyrites and was unworkable at the present price of nickel.

During the war, however, nickel has been mined again and is now smelted at Klefva in Småland and Kusa in Dalarne. The production in 1915 was 1,642 tons of ore.

Cobalt used to be worked at Tunaberg in Södermanland but the mines are now abandoned.

Silver used to be of great importance but is now mined only at Sala in Västmanland. These mines, which date from the fifteenth century, used to belong to the State but since 1890 have been private property. The output used to be about 3 tons a year but the ore is now almost exhausted and the output is entirely from the heaps of gangue. In 1913 Sweden's total output of fine silver was about 1 ton including some produced as a by-product at Hälsingborg and Falun copper works. In 1916 the output was about the same.

Lead is produced only as a by-product in the refining of silver and has never been of great importance. It is produced at the Sala silver works and the Trollhättan zinc works. Sweden's total manufacture of lead was 1,235 tons in 1913 and 2,075 tons in 1916.

Titanium occurs in titaniferous iron-ores. See under *Iron*.

Manganese ore is found at Bölet north of Karlsberg and at Späxeryd and Hohult, south of Jönköping. In 1913 the total output of ore was 4,001 tons including 3,894 tons of concentrate. The demands arising out of the war gave a great impetus to the mining of manganese ores and by 1916 the

output was 8,894 tons. New smelting works for the production of ferro-manganese alloys have been started at Trollhättan.

Gold.—The one mine in Sweden, at Ädelfors, was abandoned about 90 years ago after having given poor results. The only gold now obtained in Sweden is produced as a by-product at the Falun copper works. In 1916 the amount of gold ore mined was 230 tons and the total yield of gold about 49 lb. troy.

Molybdenum ores are now being mined. In 1917 Sweden is said to have produced about half the world's output. It is found as molydenite.

Graphite mining is now flourishing. The chief deposits are at Vittangi in Norrbotten.

QUARRYING

The granites, gabbros, and other igneous rocks of Norway are quarried to some extent for harbour works but chiefly for export as paving stones and for monumental purposes. Until recent years stone has been little used for house building (see p. 267). Quarries at Fredrikshald and Fredrikstad are worked for paving setts and kerbstones. The export showed a decline in 1913. The so-called Labrador stone from near Larvik has some value for decorative purposes.

Felspar is quarried on Tysfjord in Nordland; about 40,000 tons are exported annually.

The exports of granite in one form or another amounts to about 200,000 tons a year.

In Sweden there are a few quarries of granite and other igneous rocks for building and monumental purposes. Sandstone is used extensively for building and the chief quarries are in Skåne, Gotland, and between Gäfle and Storsvik. Black-granite, a trade term for various kinds of diabase, diorite, hyperite, and gabbro is quarried in many places but principally in Skåne. Red granites are exported from many parts of Småland. At Blyberg near Älvdalen in Dalarne there are

quarries of red and black porphyry. The Kolmård hills west of Nyköping are famous for their marble and serpentine.

In Skåne there is much good fire-clay but clay for pottery is chiefly imported. Limestone suitable for the production of lime is fairly plentiful in the south of Sweden. Kieselguhr, a siliceous earth of fossilized diatoms, is found at Osby in Skåne and in Lapland.

CHAPTER X

MANUFACTURES AND INDUSTRIAL CONDITIONS

NORWEGIAN MANUFACTURES

THE importance of manufacturing industries in Norway is not yet relatively equal to that in Sweden. Although certain industries are of old establishment, it was not until the last two decades of the nineteenth century, and especially since its close, that Norway entered upon an industrial evolution which was accompanied by the establishment of a number of new manufactures and the employment of a steadily increasing number of hands and machines. The number of manufacturing establishments increased from 4,039 in 1897 to 5,620 in 1909 and 6,958 in 1915, and the hands employed in 1915 numbered 152,725 (as compared with 363,864 in Sweden). An indication of the relative importance of groups of industries is afforded by the number of hands employed in them in 1914 and 1916.

	1914.	1916.
Mining	7,965	8,208
Quarrying and plastic arts	10,093	8,730
Machine-construction and metal industries	29,595	36,706
Chemical industries	8,954	12,167
Electricity-production and transmission	955	1,970
Textile industries	11,428	11,639
Paper industry	15,442	15,484
Leather and rubber	1,192	1,378
Wood, bone, ivory, &c.	21,528	24,526
Food-industry, &c.	20,735	24,472
Clothing and laundry	10,019	11,275
Printing, &c.	4,034	4,403
Other industries	3,580	764
Total	145,520	161,722

Figures for no later year than 1909 are available for the purpose of a general view of the relative importance of the

principal Norwegian industries (in groups) according to their value in millions of kroner. As indicated in following paragraphs, several of the industries have grown largely since that year. The figures are as follows :

Food products	154.32
Paper, leather, rubber	87.39
Wood and wood wares	64.19
Metal industries	51.10
Textiles	32.58
Electro-chemical and electro-metallurgical	13.71
Clothing	13.07
Oil and fats	12.74
Power, lighting, and heating	10.41
Printing, &c.	9.63
Quarries, stone, earthenware, &c.	9.29
Mines	9.21
Chemical industries	8.86

Owing to the nature of the country, its climatic conditions, the distribution of accessible water-power, &c., manufacturing industries in Norway are rather strictly localized. The greatest industrial activity is found in the *amter* of Kristiania, Smaale-nene, Akershus, Buskerud, and Sondre Bergenhus, and within these especially in, and in the vicinity of, the towns of Kristiania, Bergen, Fredrikstad, Fredrikshald, and Sarpsborg, and Drammen. Other relatively important industrial centres are Skien and Porsgrund, Trondhjem, Stavanger, Larvik, Kristiansand, and Arendal. By far the larger part of the manufacturing activity of the country, therefore, is found in districts on or near the coasts south of a line between Bergen, Kristiania, and the frontier to the east. In the industrial districts of Kristiania and Bergen the machine and textile industries are of chief importance, while the districts of Fredrikstad and Drammen are centres of the wood-sawing and planing industry, the last-mentioned district and that of Skien being also centres of the wood-pulp and paper industries. Stavanger specializes in the production of tinned foods, and in the Trondhjem district the mechanical industries predominate. Further indication of the distribution of the principal manufacturing industries will be given below.

Manufactures connected with Food and Drink

Flour milling is carried on, in great part, in small local water-mills, and the dairying industry is still largely confined to the farms, and notably (as characteristic of Norwegian life) to the upland *saeters* in summer (see further, Chap. VIII). Tinned foods, principally fish products, form an important group of production for export. For these Stavanger is the principal centre, with other places in the vicinity, such as Skudeneshavn. The fish called *brisling* and small herrings are largely used, and the total export of tinned fish and meat amounted to more than 35,000 tons in 1914. Margarine, condensed and sterilized milk, and other foods are also produced; the export of preserved milk in various forms was nearly 20,000 tons in 1914. Other important centres for manufactured food-products are Kristiania, Bergen, Moss, Trondhjem, Kristiansand, and Larvik. Brewing is fairly widespread; Strand in the Stavan-ger district is an important centre, in addition to large towns such as Kristiania, Bergen, and Trondhjem.

Metal and Chemical Industries

Though the metal and mechanical industries of Norway have not attained a development equal with those of Sweden, there are a few large establishments and a great number of small works, principally along the coasts. Centres of greater or less importance are Kristiania (with iron and steel foundries, engine and electrical works, &c.), Bergen, Trondhjem, Drammen, Fredrikshald, Moss, Hamar, Lillehammer, Gjøvik, and Tönsberg for metal and machinery industries generally, to which may be added the mechanical workshops of Fredrikstad and Sarpsborg, Sandefjord, Arendal, Grimstad, Stavanger, Hauge-sund, and Kristiansund, the iron and steel works of Tvede-strand and Holt north of Arendal, and the foundries of Kragerö, Hof, and Hollen. A number of these places, and some others, are specially concerned with iron shipbuilding and repairing; among these are Kristiania, Bergen, and Trondhjem, Sande-fjord, Arendal, Stavanger, Risör (with Dybvaag and Östre

Moland in the vicinity), Grimstad, Lillesand, Kristiansund, and Søgne, together with a few places along the coast north of Trondhjem. There are marine motor factories at a number of these coast stations. The principal railway locomotive works are at Hamar, and the railway carriage and tramcar-building works are capable of meeting the requirements of the country.

A large industrial development has taken place of recent years in the direction of the electric smelting of metals, and the output of various electrothermic products, by the use of water-power. Electric iron-smelting works are established at Tinfos on the Tinelv at the head of Hiterdalsvand, which drains to the Skagerak below Skien. In the same drainage basin, near Skien, are the Ulefos works on Nordsjön. Another establishment is at Stavanger, using power from the Ryfylke station, and dealing chiefly with metal from old ships, not with ore. The Hardanger Works use power from the Tysse station ; down to 1913 they had not operated uninterruptedly. There are other works at Nes near Tvedestrand, and elsewhere. The briquetting works at Sydvaranger yielded 450,000 tons of *slich* and briquettes in 1913, of which Germany took 70 per cent. and the United Kingdom 30 per cent. There are magnetic separating works at Bogen in Ofoten and Rödsand in Nordmøre. Nickel from the Flaad and Feiö mines is smelted at Evje and refined at Kristiansand ; smelting as well as mining is also carried on at Ringerike. At the Sulitjälma copper mines in 1913 about 11,570 tons of hut and fine ore and 14,580 tons of Elmore concentrate were smelted, giving on the average about 5.3 per cent. of copper, and extensions of the power station, boring machinery, &c., were in progress.

Electrothermic products include calcium carbide and cyanamide, nitrates, ferro-silicon, ferro-chrome, zinc, aluminium, and Norwegian saltpetre. Important works are established at Rjukan, at Notodden close to Tinfos, and at Odda in Hardanger. The Höjang Company has an aluminium factory on the Sognefjord, with its own power-plant of 20,000 horse power, designed for an annual output of 4,000 tons ; the company owns bauxite deposits in France. The Tyssedal

Nitride Company uses 30,000 h.p. from the Tysse power station, and the Arendal (Eydehavn) Nitride Company 25,000 h.p. from the local power plant. French interests are concerned in both these works, and British in the smaller works at Vennesla and Stangfjord. The export in 1916 of Norwegian saltpetre amounted to 46,000 tons (metric), cyanamide 13,152 tons, ferro-silicon 25,255 tons, calcium carbide 58,433 tons, ammonium nitrate 59,639 tons, ferro-chrome 2,875 tons, and aluminium 4,488 tons. Refined zinc was exported in the same year to the amount of 28,150, iron and steel 1,996, nickel 723, and copper 1,430 tons. In 1915 the total output of smelting works was : fine silver, 11,900 kilograms ; copper, 2,828 tons, nickel 892 tons, iron and steel 8,741 tons. Nitroglycerine is produced at Hurum.

Manufactures connected with Timber Production

Sawing and planing mills are common in all counties except the two northernmost, being situated mostly by large rivers down which timber can be floated from the forests. They are most numerous in Smaalenene and Akershus, and the most important centres for them are the adjacent towns of Fredrikstad and Sarpsborg. Others are Skedsmo near Kristiania, Larvik, Fredrikshald, Skien and Porsgrund, Kragerö, Kristiansand, and Mandal, but the industry is found at or near almost every important coast station in the south, at several inland points, and as far north as Klaebu, Levanger, Namsos, and Stenkjaer. Chemical pulp works and grinding mills are also fairly numerous ; for these the chief centres are Skien and Porsgrund, Drammen (one of the most important lumbering centres in the country), Kristiania, Fredrikshald, and Kragerö, with others at Eidsvold, Gjøvik, Hønefos, Modum, Vennesla, &c. The cellulose manufacture is carried on chiefly at Sarpsborg, Moss, and Bamle (Brevik). Pulp, cellulose, &c., were exported to the amount of 638,346 metric tons in 1914.

The manufacture of paper, closely associated with the timber industry, centres chiefly at Skien and Drammen, with other works at Fuse near Bergen, Modum near Kristiania, Hitterdal,

&c. In 1914 188,217 metric tons of paper and paper goods were exported, consisting principally of packing, news and other printing papers.

There is a large manufacture of matches at Fredrikshald, Skedsmo, Larvik, &c., and 4,482 metric tons were exported in 1914.

Owing to the demand for tonnage and the scarcity of steel, there has been recently a great revival in the construction of wooden ships in Norway. After years of more or less complete inactivity, shipyards for wooden vessels were again in full work in 1918, and a number of new yards were established to meet the demand. In September 1918, 91 vessels were under construction, 11 having steam engines, and the remainder oil motors. The dead-weight capacity of these vessels seldom exceeds 1,000 tons, larger wooden vessels (mostly 2,000 to 3,500 dead-weight capacity) being ordered from American yards. Small boat-building, however, is a regular and widespread industry.

Textile and Miscellaneous Manufactures

Textiles and Clothing.—For the textile industries generally Kristiania is by far the most important centre, but works of considerable size are also found at or near Bergen (with Haus, Bruvik, and Hammer), Fredrikshald, Strømmen, Kristiansand, Trondhjem, Stavanger and Sandnes, Ullensaker, Tönsberg, Voss, Aalesund, Kristiansund, &c. Wool spinning and weaving are carried on (though not on a large scale) at Eidskogen, Söndre Undel, Os, Ullensvaug, Sogndal, Indviken, &c. Clothing manufactures are found notably in and near Bergen, and there is a waterproof clothing factory of some importance at Moss, and a boot and shoe factory at Tönsberg. The larger rope-works are mainly in the west, as at Bergen.

Bricks, Pottery, Glass, &c.—Brick and tile works have increased in numbers with the growing preference for bricks over wood in building, especially in towns which have suffered from fires in recent years. The chief centres are Fredrikstad, Kristiania, and Skien, together with Rakkestad, Ullensaker,

Haugesund, Nedre Stjørdalen, Sandnes (near Stavanger), Inderöen, &c. Pottery is manufactured on a considerable scale at Porsgrund and Sandnes. The products of the Egersund *faience* factory are well known locally. The principal glass-works are in Kristiania, Larvik, Jevnaker near Hønefos, and Hurdalen near Eidsvold.

Peat.—There has been in recent years an attempt to make a fuller use of peat (see Chap. III). There are about ten peat fuel factories, and peat litter is made in increasing quantity at Klæbu and elsewhere.

Industrial Conditions

The average daily wage of adult industrial workers insured in Norway in 1914 was 4.42 kroner (about 5s.) for men ; 2.17 kroner (about 2s. 5d.) for women. For men, women, and children it was 4.19 kroner (about 4s. 8½d.) in 1914 ; 3.4 kroner (about 3s. 10d.) in 1910 ; and 2.95 kroner (about 3s. 4d.) in 1905. The employment of children of school age in remunerative work is strictly limited by law. About 18 per cent. of the school children of the towns were so employed, at some period of the school year, in 1915.

Workmen's insurance is compulsory, in most trades, against sickness and accident ; and contributions are made to a pension-fund. Nearly 350,000 people were insured under the national health-insurance scheme in 1915. Labour bureaus play an important part in Norway. In 1916, 62,305 men and 31,376 women sought employment through them ; 106,265 places were offered, and 70,488 places were filled. The labour movement is fairly active, and well organized. In 1916, 80,628 workers belonged to societies of the Norwegian Central Workers' Association.

SWEDISH MANUFACTURES

The following table shows the number of persons employed in the various branches of industrial labour in Sweden in 1914 and 1916 :

	1914.	1916.
Mining for metals	13,383	14,700
Metal-working and machine-construction.	99,121	120,323
Coal-mines, quarries, peat, and plastic arts	43,321	35,886
Wood industries	55,926	61,762
Paper-pulp and paper-making	23,441	25,524
Printing, &c.	13,999	15,166
Food industries, &c.	37,380	39,703
Textile and clothing industries	44,772	46,017
Leather, hair, and rubber industries	13,919	15,686
Chemico-technical industry	14,847	17,684
Electricity, gas, and water works	4,736	5,372
Total	364,845	397,823

Figures for 1912 give a general view of the relative importance of the principal Swedish industries according to the value of their output in millions of kronor :

Sawmills and planing mills	174·14
Flour and grain mills	118·19
Wood-pulp factories	115·73
Iron and steel manufactures and foundries	113·07
Mechanical workshops	98·38
Wool and cotton cloth factories	89·61
Bar iron, hammer, and rolling mills	80·44
Sugar refineries	73·65
Iron works for unrolled intermediate products	73·53
Spinning mills	70·73
Paper mills	64·14
Mines (ore)	58·12
Blast furnaces	53·39
Raw sugar factories	43·59
Breweries	40·60
Boots and shoes	36·04
Metal manufactures other than iron	35·39
Joineries	30·83
Tanneries	30·83
Spirit factories	30·19
Distilleries	25·14
Margarine works	24·47
Book printing works	23·74
Electric machinery and apparatus manufacture	23·43
Tobacco factories	23·03
Bakeries	21·20
Stone quarries and dressing	20·17
Electric power works	19·11
Sewing establishments	17·62
Match factories	16·57
Wharves and dockyards	15·97
Brick and pottery works	15·62

Out of the above-named industries the figures for those which can be classified as metal industries (which are in very large proportion associated with the iron production of the country) amount to 512,320,000 kronor. Those which can be classified as wood and paper industries (associated primarily with the forests, and including the match manufacture) yielded an output valued at 401,410,000 kronor. Those connected with the production of food and drink yielded 377,030,000 kronor, and the textile industries yielded 177,960,000 kronor. The above figures exclude a 'miscellaneous' group with a total output valued at 384,600,000 kronor. According to the total value of manufactures, coupled with value per head of the population, the principal manufacturing localities of Sweden are the läns of Malmöhus, Göteborg och Bohus, Gäfleborg, and Kopparberg, and the city of Stockholm.

It may be stated generally that Swedish manufactured goods are of a high standard of quality, but are frequently expensive, and on that account meet with difficulty in competing with the imported products of other countries whose manufacturing industries are on a larger scale.

Manufactures connected with Food and Drink

Small flour mills, usually driven by water, are numerous in most parts of Sweden. In a few localities, where level tracts are extensive and water-power is wanting, as in Skåne and Västergötland, windmills are used. But of recent years many large mills have been established in the more populous centres, as in Stockholm, Uppsala, Norrköping, Kalmar, Kristianstad, Trälleborg, Malmö, &c., and the farmer's practice of having his own wheat-flour ground for his household at a local mill has, to a great extent, disappeared in favour of that of selling his grain and buying his flour from the larger industrial mills. Swedish wheat as a rule requires blending with imported wheat (under normal conditions principally Russian) to produce a satisfactory baking flour. The simple grinding required for the rye flour which is the most widely used for bread (the

characteristic *knäcke brod* or *hårt brod*, hard bread) is still mostly done in the small local mills.

There is an important dairy industry carried on (apart from the farms) in co-operative dairies, which are most common in the south and north, and in companies' dairies, which are found mainly in the central districts. Margarine is an increasing manufacture, which in normal conditions allowed for a limited export.

Beet sugar is manufactured in a small number of factories of which the majority are in Skåne.

Spirits are produced mainly from potatoes, though grain (principally barley and rye), and to a less extent molasses and sugar-beet, are also used. The manufacture is centred chiefly in Skåne, Uppland, Blekinge, Gästrikland, and Halland. Swedish punch is a mixture of arrack, water, and sugar, and there are some 100 works engaged in its production. The manufacture of berry-wine is considerable. Lager beer is brewed mostly in southern and western Sweden, porter chiefly in Göteborg; pilsener in Stockholm and Norrland. Of the largest breweries four are in Stockholm and two in Göteborg.

The mineral water factories are of considerable importance, and natural waters are bottled from a number of springs, such as those of Porla, Ronneby, and Karlstad.

Metal and Chemical Industries

Mechanical works, iron and other metal works, and foundries are distributed throughout the industrial districts of Sweden, being established especially in the coast towns and at inland places with good communications by lakes, canals, and railways, water-power, &c. In the following list are mentioned the names of places (in alphabetical order) where some of the chief of these works are situated, with particulars of their principal products, &c.

Ankarsrum, Kalmar län. Ironworks, projectiles, pressed steel goods.

Arboga. Mechanical works ; turbines, wood-pulp and paper machinery, mill-gearing, &c.

Bofors, Karlskoga, Örebro län. Ironworks with two blast furnaces, three Martin furnaces, ten Lancashire forges, three rolling mills ; manufacture of ingots, bar iron, cannon, projectiles, steel castings (propellers, &c.).

Domnarvet, near Falun, Dalarne. Large charcoal ironworks of Stora Kopparbergs Bergslag Company. Smelting department with five blast furnaces, seven Cowper apparatus, five roasting furnaces, &c. ; Bessemer works, with four basic convertors, blasting apparatus, hydraulic-power plant, and basic slag works ; Martin furnaces and steel foundry ; rolling mills, for wire, heavy ironwork, rails ; electric smelting works ; nail, nut, and bolt factory ; charcoal furnaces and factory for utilization of by-products.

Eskilstuna. Munktel mechanical works, for portable engines, steam boilers, threshing mills, dredging apparatus, excavators, machine and hand tools, oil motors, refrigerators, &c. Steel-pressing works, enamelled goods, &c. (Eskilstuna Stålpressning Company). Tunafors factory (edged tools, skates, &c.). State rifle factory. There are many other factories in and near Eskilstuna, which has a special reputation for the manufacture of cutlery, hinges, locks, tools, skates, and small metal goods of every sort.

Fagersta, Västmanland. Ironworks, rolling mills, saw blades, springs, drawn wire, &c.

Falun. General manufactures, and especially railway coaches, tramcars, carriages, &c.

Göteborg, an important manufacturing centre. The Göteborg mechanical works (Götaverken), with establishments in the town and on Hisingen Island, builds steamships (including armoured vessels), steam-engines and boilers, cranes and elevators, radiators, railway carriages, and various cast goods. Lindholmen works on Hisingen Island form one of the principal shipyards in the country, with slip and dry dock, building and repairing steamships of all kinds. Eriksberg and Torskog shipyards. The Svenska Kullagerfabriken or ball-bearing factory

(commonly called S.K.F.) has its head-quarters at Göteborg and branches in various parts of the world : a special manufacture is that of automatically adjusting ball-bearings on the Wingquist system.

Granefors, Blekinge. Copper and brass works : sheet-rolling mill, wire-drawing plant, tubes, &c.

Hagfors, Värmland. Screws, nails, horse-shoe nails, frost nails, &c.

Halmstad mechanical works ; turbines, &c.

Hälsingborg mechanical works ; locomotives, railway carriages. Electro-steel works recently established.

Halstahammar, Västmanland. Bolts, nuts, fish-plates, rivets.

Huskvarna, near Jönköping. Rifles, sewing machines, cycles, stoves, radiators.

Iggesund, Gäfleborg. Saw blades, planes, quarrying and mining implements.

Jönköping mechanical works. Steam engines and vessels, turbines and boilers, sulphate boilers, paper-making machinery, &c.

Karlstad and *Kristinehamn* mechanical works, owned by the same company. Steam launches, portable engines, railway carriages and material, turbines, machinery for wood-pulp and paper industry, &c.

Kolsva, Västmanland. Various steel castings (propellers, &c.).

Kristianstad. Ljunggren works ; locomotives, railway carriages, distilling machinery, &c.

Lund. Carl Holmberg works : dairy appliances, distilling apparatus, steam engines, cast goods. The same company owns the Armatur-fabrik here, the largest in Sweden for cranes, valves, steam-whistles, &c.

Malmö. Among the principal works here are those of the Kockums Mekaniska Verkstad, with shipyard, foundry, and manufactures of boilers, steam engines, railway carriages, sugar-refining machinery, &c. The Arlöf mechanical works and wagon factory, in the neighbourhood of Malmö, build railway carriages, tramcars, &c. The Scania-Vabis company

of Södertälje has works at Malmö for motor lorries, marine motors, and railway motor cars.

Motala. Works at the junction of the Göta canal with Lake Vättern. Locomotives, ingots and bar iron, rolled wire, marine engines, turbines, bridges. These works collaborate with the Lindholmen shipyard at Göteborg in the building of armoured vessels.

Norrköping. Vulcan works; steam engines, portable engines, &c.

Oskarshamn. Steamship and general mechanical works.

Oxelösund. Iron-smelting works, the first in Sweden using coke, established in 1917.

Porjus, Norrland, on the Stora Luleälf. Electric smelting works recently established; three furnaces with weekly capacity of 150, 70, and 65 tons; extensions in course of erection (1918).

Sandviken, Gästrikland (15 miles from Gäfle). Four blast furnaces, two Bessemer furnaces, seven Martin furnaces, fourteen steam hammers, rolling mills, tube mills, wire-drawing works; shafts, saw-blades, sectional iron and steel, &c., are produced: the establishment is one of the largest in Sweden.

Södertälje. Railway coach and tramcarworks. Scania-Vabis company's works for motor cars, cycles, &c.

Stockholm. Among the important works in and near the capital the following may be mentioned. Those of the Separator Company, probably the largest mechanical works in Sweden, make separators and other dairy implements, the production of which is an important branch of Swedish mechanical industry, occupying many smaller factories. De Laval's Ångturbin works: turbines, steam-engines, fire-engines, &c. Bergsunds Mekaniska Verkstad, with foundry at Södermalm and shipyard with slip at Finnboda; steamships and all kinds of machinery are constructed, castings, sheet metal, oil motors, bridges (most of the State railway bridges are by this firm). Atlas works, noted specially for air-compressors and pneumatic tools (the pneumatic rock-drills of this establishment are almost exclusively used in Swedish

mines) ; locomotives, oil motors, transport appliances, bridges. Bolinder works : steam engines, oil motors, boilers, saw-mill machinery, stoves, ovens, &c. ; the same company owns slip at Bastholmen in Bohus län, where marine motors are fitted, and other works. Ludvigsberg works : radiators, ventilators, refrigerators, pumps, fire-engines, &c. Mekanikus works : steam engines, printing machinery, &c. Diesel motor works at Sickla ; especially marine Diesel engines. Svenska Gasaccumulator Company : lighting apparatus for lighthouses, buoys, beacons, railway carriages, motor cars, &c. ; welding apparatus. Ericsson telegraph, telephone, and fire-alarm works. Luth and Rosen electrical works. Lux lamp factory. Primus portable petroleum stove factory.

Surahammar, Västmanland. Shafts, wheels for railway carriages.

Svartån. Skultuna brass works.

Tannefors. Swedish railway works.

Trollhättan. Foundry and mechanical works : locomotives, turbines, pumping apparatus, air compressors, gas engines, iron bridges, &c. Electro-metallurgical works using 18,000 h.p. and concerned principally with the production of zinc.

Västerås, Nordiska Metallverken : brass, copper, and aluminium works. Almädda Svenska Elektriska Company : electric motors, dynamos, &c.

The various processes of electro-metallurgy have been developed in recent years, as in Norway, at several of the centres mentioned above. The electro-chemical industry has been similarly extended, and among its more important branches are those connected with the manufacture of matches, the production of calcium carbide and cyanamide, superphosphate, and other fertilizers, nitric acid, alkali, chloride of lime, &c., as at Alby and Ljunga on the Ljunga älf, Månsbo on the Dalälff, Bengtsfors (Dalsland), and elsewhere. The Vinterviken explosives factory was established by Alfred Nobel. The State possesses a gunpowder factory at Åker in Södermanland, and munition factories at Marieberg near Stockholm, and Karlsborg in Skaraborg.

The total production of pig-iron in Sweden in 1915 was 760,701 metric tons, the most productive läns being those of Kopparberg, Örebro, Gäfleborg, and Västmanland, in that order. The output of wrought-iron and steel was 720,195 tons, of zinc 8,588 tons, of copper 4,561 tons, and of lead 1,918 tons. The export of pig-iron in 1914 was 164,049 tons. In the same year 41,842 tons of superphosphate and 12,715 tons of carbide were exported.

Manufactures connected with Timber Production

Wood-pulp.—The wood-pulp industry is found in nearly every län in Sweden, but chiefly in Värmland, Västernorrland, and Gäfleborg. Nearly half the total output comes from the factories in the coastal districts of Norrland. A *kontor* or central institute for the industry, with experimental station, has been opened at Stockholm. The first factory for mechanical wood-pulp was established at Trollhättan in 1857, and grinding mills became numerous after that date, until in recent years the demand for chemical wood-pulp led to the more rapid establishment of cellulose factories. The chemical wood-pulp is manufactured chiefly by two methods, the soda or sulphate (alkaline boiling), and the sulphite method, in which calcium bisulphite is the solvent principally used. The greater part of the mechanical wood-pulp is made from spruce, though aspen and some fir are also used. With the sulphate method both spruce and fir are used; with the sulphite method, spruce almost exclusively. The sulphite method has grown, of recent years, to an importance largely exceeding that of the sulphate and mechanical processes. In 1914, 932,057 tons of pulp were exported.

Sulphite Spirit.—Among by-products (including turpentine, resin-soap, &c.) sulphite spirit has been produced lately in greatly increasing quantity. In July 1918 there were four sulphite spirit works in operation with an annual output estimated at 3,000,000 litres; four others were about to start operations; ten more were expected to do so during the year, and some of the sulphite mills were contemplating establishing

spirit plants. The spirit is used for motor fuel (in view of the shortage of other fuels), and to some extent for outdoor lighting, &c.

Matches.—Swedish matches are well known through their wide export, which amounted to 35,468 tons in 1914. The principal centre for their manufacture is Jönköping. The timber almost exclusively used is aspen. Most of the necessary chemicals must be imported, but chlorate of potash can be obtained in Sweden.

Paper.—The Swedish paper industry is old-established, and yields a large export (163,366 tons in 1914). It is carried on at a number of scattered centres principally south of 60° N. lat. Among the oldest mills still working are those of Klippan, Lessebo, Grycksbo, and Gransholm; these are all chiefly concerned with the better qualities of printing and writing paper. Of late years there has been a tendency to specialize, notably in the manufacture of paper for newspapers, as at Holmen in Norrköping, Lilla Edet, and Domnarvet, and also in that of wrapping paper, as at Strömnäs, Frövikfors, and Örebro.

Joinery, &c.—Among other manufactures connected with the timber output mention may be made of joinery and furniture, as at Åtvidaberg, Västervik, Katrineholm, &c., and of casks (as at Uddevalla and Åstorp), for which there is a large demand in connexion with the butter and margarine, fish-curing, and other industries.

Further reference to manufactures connected with timber will be found in Chap. VII.

Textile and Miscellaneous Manufactures

Textiles.—The Swedish textile industry is flourishing; under normal conditions before the war the import of yarn and manufactured goods was not materially increasing, while the import of raw materials was increasing considerably. The most important group of textile industries, principally cotton, is found in Älvsborg Län, where Borås is the centre of the industry; the textile manufacture of this län has an

output value about one-fourth of that of the whole country. The chief seat of the woollen industry is Östergötland, the principal centre being Norrköping. Other large wool factories are situated at Malmö, Göteborg, Nyköping, Kristianstad, Jönköping, Halmstad, Lund, and Borås. Important centres for cotton mills, besides Borås, are Göteborg, Norrköping, Näås, Viskafors, and Gäfle. There are a few large linen and jute mills; these again are found principally in the Göteborg and Borås districts. Dyeing and bleaching works are numerous, but, apart from those attached to the large textile factories, mostly small; the most important are the dye-works of Levanten near Göteborg.

Hats.—The principal hat factories are in Stockholm, Falköping, Karlskrona, and Malmö.

Leather.—The largest tanneries in Sweden are in the district of Stockholm (Järla), in Valdemarsvik, Sölvesborg, Nättraby, Simrishamn, Malmö, Landskrona, Ängelholm, Falkenberg, Vänersborg, Alingsås, Gäfle, and Malung in Dalarne. Chrome tanning is carried on in Klippan (Skåne) and Askersund. The principal boot and shoe factories are in Örebro and in the läns of Stockholm, Malmöhus, Göteborg och Bohus, and Älvsborg. The chief seats of the glove-making industry are Malmö, Lund, and Hälsingborg.

Rubber.—The manufacture of rubber articles is not very extensive but there are large factories at Hälsingborg, Malmö, Gislaved, and Trälleborg.

Cement, Pottery, &c.—Among manufactures connected with stone, clay, &c., reference should be made to that of Portland cement, for which there is a large factory at Limhamn (among others). Bricks, tiles, and earthenware are widely distributed manufactures, for which the chief localities are Malmöhus, Kristianstad, Stockholm, and Älvsborg läns. The Rörstrand china factory at Stockholm is famous, and the company owning it has other works in Göteborg, &c. Tile stoves are an important manufacture. Glass works are chiefly centred in Kronoberg län. The exports of glass and pottery substantially exceed the imports.

Peat.—Attempts have been made to foster the working of the extensive peat deposits (see Chap. III) by means of exchequer grants, the establishment of a State peat school, and the appointment of experts, but the industries connected with peat have not hitherto been largely developed. Recently, however, factories for the production of peat fuel and by-products have been established at Malmö and Göteborg, and peat has been brought into use on the State railways. Peat powder has been successfully employed for firing locomotives.

Industrial Conditions

According to the Swedish Employers' Association's statistics, the average wage of adult industrial workers in Sweden, in 1916, was for men 1,575·43 kronor per annum (about £88·6; i.e. 4s 10d. a day); for women 846·47 kronor (about £47·6; i.e. 2s. 7d. a day). The Post Office Savings Bank is the medium for payments made in connexion with the Swedish national insurance scheme (health insurance, fishers' insurance, and pensions insurance).

CHAPTER XI

COMMERCE AND SHIPPING

Norwegian imports and exports—Swedish imports and exports—Comparative table of values of principal groups of exports, Norway and Sweden, 1914—Shipping—Custom-house services—British consular officers.

NORWEGIAN IMPORTS AND EXPORTS¹

THE annual value of Norwegian imports at the end of the nineteenth century was about 280,000,000 kroner, and of exports, 160,000,000 kroner. In 1911 imports were valued at 468,695,000, and exports at 288,684,100 kroner, and in 1913 imports at 552,433,600 kroner (£30,690,755), and exports at 380,912,100 kroner (£21,161,784). The value of exports increased about 80 per cent. between 1908 and 1913. These and other figures quoted below exclude the value of Swedish products in transit (38,460,200 kroner in 1913), and foreign re-exports. A comparative table of the values of Norwegian and Swedish exports will be found on p. 200 for the year 1914. Under the abnormal conditions of later years, imports reached a value of 1,353,664,900 kroner, and exports of Norwegian goods 975,475,600 kroner, in 1916.

The principal groups of exports, both of which largely exceed the imports in the same groups, are still fish products, and timber and wooden wares, though these no longer hold the relatively predominant positions which they did down to the latter half of the nineteenth century, when mineral and other products began to take an important place.

Fish products exported in 1913 were valued at 123,511,518 kroner, and consisted principally of salted and dried cod, tinned fish, stockfish, salted and fresh herrings, and whale oil.

Timber and wooden wares exported in 1913 were valued at 90,740,394 kroner, and consisted principally of wood-pulp

¹ For quantities of certain important imports and exports see Chapters VII (Agriculture and Forestry), VIII (Fishing and Hunting), and IX (Mining and Quarrying).

and cellulose, and timber, with a considerable quantity of manufactured articles and of matches. In addition, paper, chiefly printing and packing, made from wood-pulp and cellulose, was exported to the value of about 78,750,000 kroner.

The other principal exports are, in the group of products of agriculture, dairying, &c., skins of domestic animals, condensed milk, butter, sterilized milk and cream; and in the group of minerals and the chemical industries, ores (chiefly iron), saltpetre, calcium carbide, zinc, nitrate of ammonia, cyanamide, copper, granite paving stone, &c., nitrate of soda, aluminium, and nickel. Ships are an important item, as also is ice, exported chiefly from Kragerö, Kristiania, Brevik, Dröbak, and Porsgrund.

The import of foodstuffs largely exceeds the exports, the principal items being cereals (64,088,200 kroner in 1913) and groceries, and the same applies to minerals, metals, and metal goods, in which the most important single items are machinery, ships, and coal. Among other large imports are textiles, oils, fats, rubber, &c.; hides, and manures.

On the value of imports and exports per head of the population, compare the section dealing with Sweden, below. The countries with which, before the war, Norway carried on the most trade were the United Kingdom, Germany, the United States, Sweden, Holland, France, Belgium, Russia, and Denmark. The United Kingdom was the largest buyer of Norwegian products, and the most important articles supplied by the United Kingdom to Norway were coal, steamships, tinplates, and cotton piece-goods, with a considerable amount of wheat flour, wool and woollen yarns, machinery, &c.

SWEDISH IMPORTS AND EXPORTS ¹

Both the imports and the exports of Sweden had increased largely in value in and since the second half of the nineteenth

¹ For quantities of certain important imports and exports, see Chapters VII (Agriculture and Forestry), VIII (Fishing and Hunting), and IX (Mining and Quarrying).

century and before the war ; the exports, of late years, more markedly than the imports. The mean annual value of imports during three recent quinquennial periods rose thus : 1896-1900, 452,324,000 kronor ; 1901-5, 533,391,000 kronor ; 1906-10, 644,741,000 kronor ; in 1911 the value was 696,617,000 kronor, and in 1912, 784,867,000 kronor (about £43,603,700). The rise in the value of exports was proportionately much greater : 1896-1900 (mean annual value), 358,581,000 kronor ; 1901-5, 410,447,000 kronor ; 1906-10, 515,361,000 kronor ; 1911, 663,575,000 kronor ; 1912, 760,626,000 kronor (about £42,257,000). On p. 200 a comparative table of the values of Swedish and Norwegian imports will be found. Under the abnormal conditions of later years the value of imports into Sweden rose in 1916 to 1,152,659,765 kronor (£63,472,454) and in 1917 was slightly lower ; the value of exports in 1916 was 1,328,065,407 kronor (£73,131,355), and in 1917 it rose to £86,465,387. In 1912 the values of imports and exports according to ' production groups ' were given thus :

	<i>Imports.</i>		<i>Exports.</i>	
	<i>kronor.</i>	<i>Per cent.</i>	<i>kronor.</i>	<i>Per cent.</i>
Products of agriculture, dairy- ing, &c.	273,649,000	34·87	130,648,000	17·18
Products of forestry and timber industry	20,751,000	2·64	192,701,000	25·33
Products of textile and allied industries	79,384,000	10·11	9,522,000	1·25
Products of paper industry . .	9,626,000	1·23	136,671,000	17·97
Minerals and products, excluding metals	140,243,000	17·87	115,745,000	15·22
Metals and products	111,458,000	14·20	158,778,000	20·87
Products of other industries .	149,756,000	19·08	16,561,000	2·18

An excess of imports over exports was shown, under normal conditions, in the case of cereals and cereal products ; coffee, tobacco, and other ' colonial wares ' ; liquors, textiles, hides and skins, oils, tallow and resins, and unwrought minerals. This last group includes coal, the heaviest single import ; but on the side of exports it includes iron-ore (to the

value of 59,720,000 kronor in 1912), cement, superphosphates, block granite, zinc ores, &c.

Among articles of which the export exceeds the import, timber and timber wares predominate. Living animals and animal foods were exported in 1912 to more than three times the value of the imports, which consisted chiefly of bacon and salted herrings. The chief exports include butter, cattle, bacon, fresh meat, and cream. The export of machinery, &c., began to exceed the import after 1909. The exports consisted mainly of separators and other dairy and agricultural machines, oil motors, electric generators and motors, telephone apparatus, &c. Other important products of which exports exceeded imports are matches, paving stone, glass, earthenware, pig-iron, bar-iron, &c., paper and pulp.

The value of imports per head of the population before the war (142 kronor in 1912) was largely exceeded by the values for the United Kingdom, Denmark, and Norway (223 kronor), but was approximately equal with those of France and Germany. The value of exports per head (136 kronor) was exceeded by those for Denmark and the United Kingdom, nearly equalled that for Norway (138 kronor), and somewhat exceeded those for France and Germany. The countries with which, before the war, Sweden carried on the most trade were Germany, the United Kingdom, Denmark, Norway, Russia, and Finland, followed by France, Holland, Belgium, and the United States of America. The United Kingdom was the largest buyer of the most important Swedish exports, and supplied most of the coal consumed in Sweden, in addition to textiles and many other articles. Swedish exports to the United Kingdom included unwrought timber, wood-pulp, paper, joinery, glass, matches, butter, eggs, bacon, iron-ore, bar iron and other descriptions of iron and steel.

COMPARATIVE TABLE OF VALUES OF PRINCIPAL GROUPS OF EXPORTS, NORWAY AND SWEDEN, 1914

The following table shows comparatively the values of the principal exports of Norway and of Sweden in 1914, reduced

as nearly as may be to a common grouping. Products of minor importance, not classifiable under these groups, are omitted.

	Norway. kroner.	Sweden. kronor.
Live animals	3,018,200	29,162,118
Foods of animal origin	125,154,300	86,826,403
Cereals and products	1,277,800	6,446,744
Textiles, yarns and manufactures.	2,657,900	20,486,802
Skins, hair, feathers, and manufactures.	32,649,400	27,225,189
Tallow, oils, tar, &c., and products	34,541,300	8,980,266
Timber and wooden goods	85,008,400	174,968,260
Paper and pulp	30,150,900	124,073,248
Minerals, raw and partly worked.	19,842,000	71,245,208
Minerals, worked (including glass, pottery, cement, &c.)	20,591,800	36,826,163
Metals, raw and partly worked	27,114,100	71,430,185
Metals, wrought	2,348,600	28,935,680
Ships, carriages, machines, &c.	6,501,100	63,274,972

SHIPPING

Both Norway and Sweden have mercantile marine fleets which are large in comparison with the populations of the two countries. Before the war steamer tonnage under the Norwegian flag stood fourth on the world's list, and Swedish steamer tonnage ninth.

The following statistics of Scandinavian shipping are taken from the *Repertoire general* of the *Bureau Veritas* for 1917-18 and give the figures up to August 1917. They include all seagoing steamers of over 100 tons gross register and all sailing vessels over 50 tons gross register. Auxiliary motor and steam vessels are not included. These facts must be borne in mind in comparing the figures with those derived from other sources.

SCANDINAVIAN SHIPPING, 1917 (Bureau Veritas)

	Steamers		Sailing Vessels		Total	
	over 100 tons gross.		over 50 tons gross.			
	No.	Gross tonnage.	No.	Gross tonnage.	No.	Gross tonnage.
Norway	1,483	1,945,110	640	387,349	2,123	2,332,459
Sweden	987	855,588	863	148,359	1,850	1,003,947

The official Norwegian and Swedish figures for the end of the respective years are given below. They include steamships, motor vessels and sailing ships, and in the case of Sweden, vessels on the great lakes. The Norwegian statistics cover steamers over 25 tons gross register and sailing vessels over 50 tons gross. The Swedish statistics cover all vessels over 50 tons net register. To facilitate comparison tonnage is given in tons gross. Recent Swedish statistics are not available.

		<i>Steam and motor.</i>		<i>Sailing.</i>		<i>Total.</i>	
		<i>No.</i>	<i>Gross tonnage.</i>	<i>No.</i>	<i>Gross tonnage.</i>	<i>No.</i>	<i>Gross tonnage.</i>
Norway, 1915	.	2,593	2,111,283	867	551,147	3,460	2,662,430
" 1916	.	2,755	2,162,302	740	466,971	3,495	2,629,273
" 1917	.	2,670	1,705,161	657	328,673	3,327	2,031,834
Sweden, 1915	.	1,278	984,799	1,422	161,650	2,700	1,146,449

Changes in Norway's mercantile marine including loss by the action of belligerents, submarine and mine, are given below. Comparable figures for Sweden are not available.

<i>War losses.</i>			<i>Total losses.</i>		<i>Increase.</i>		<i>Balance.</i>	
<i>Gross</i>			<i>Gross</i>		<i>Gross</i>		<i>Gross</i>	
<i>No.</i>	<i>tonnage.</i>		<i>No.</i>	<i>tonnage.</i>	<i>No.</i>	<i>tonnage.</i>	<i>No.</i>	<i>tonnage.</i>
1915	. 69	92,337	259	266,814	335	335,235	+ 76	+ 68,421
1916	. 195	270,307	448	442,397	483	409,240	+ 35	— 33,157
1917	. 434	686,972	556	811,682	388	214,243	— 168	— 597,439

At the date of the signing of the armistice it was announced that Norway had lost nearly 50 per cent. of her shipping by belligerent action but by building and purchases of vessels abroad the net loss had been reduced to 27·6 per cent. in tonnage and 30·8 per cent. in ships.

Norway.—The two companies owning the largest number of steamers are the *Bergenske* and *Nordenfjeldske Dampskibsselskab*. Most of their vessels are in the coasting trade but they also visit Newcastle, Middlesboro, Glasgow, London, Hamburg, Rotterdam, Cologne, and the Färöes and Iceland. Other important coasting companies are the *Vesteraalens* and the *Arendals Dampskibsselskab*. The coasting steamers are generally not much over 1,000 tons register and many are

between 100 and 500 tons. The institution of regular oversea steamship lines has been a comparatively recent development in Norwegian shipping. A large proportion of the steamers under the Norwegian flag are engaged as tramps or are on time charter in all parts of the world. Large vessels are an exception. Few are over 5,000 to 6,000 tons register. The largest are the *Bergensfjord* and the *Stavangerfjord* of 10,000 and 12,600 tons respectively, belonging to the *Norske Amerika Linie*.

The principal overseas lines are as follows :

Norske Amerika Linie from Kristiania, Kristiansand, Stavanger, and Bergen to New York.

Norge Mexico Gulf Linie from Kristiania to Boston, Baltimore, New Orleans, Havana, and other American ports.

Norske Afrika og Australie Linie from Kristiania to African, Indian, Australian and far eastern ports.

Norske Sydamerika Linie from Kristiania to Rio Janeiro, Santos, and Buenos Aires.

Skandinaviske Øst-Afrika Linie to Egypt, Red Sea, and East African ports.

Otto Thoresens Linie to Spanish, Portuguese and Italian ports, including the Canary Islands ; also Bergen to Brazil and Buenos Aires.

Fred Olsens Linie from Kristiania to Newcastle, Leith, Rotterdam and Amsterdam.

Dampskibsinteressentskapet Garonne to Bordeaux and Bilbao.

Also the *Bergenske* and *Nordenfjeldske* lines mentioned above.

Foreign lines serving Norwegian ports are not very numerous. Several Swedish lines call (see below). Vessels of the principal Danish line, *Det Forende Dampskibsselskab*, run between Copenhagen, Fredrikshavn and Kristiania and between Copenhagen, Bergen, and Trondhjem. Their vessels from Copenhagen to New York also call at Kristiansand. The principal British lines to Norway are the Wilson Line from Hull and Newcastle, and the Leith, Hull and Hamburg

Shipping Co. whose vessels between Leith and Copenhagen call at Kristiansand.

Navigation with foreign countries in 1916 entailed 9,443,166 tons of shipping. In 1914 the total was 11,365,724 tons, including 5,667,067 tons Norwegian owned ; 1,290,076 tons Swedish ; 1,505,248, Danish ; 404,115 German, and 339,291 tons British.

Sweden.—Most Swedish, like Norwegian vessels, are of comparatively small tonnage and many are engaged in the coasting trade. The largest is the *Stockholm*, 12,606 tons, of the *Svenska Amerika Linie*. Few other vessels are over 5,000 tons.

The principal shipping lines are the following :

Svenska Amerika-Mexiko Linie, from Göteborg to New York and Gulf ports.

Rederi Aktiebolaget Transatlantics Linie, from Göteborg to West and South African, Persian Gulf, Australian, Pacific, and Javanese ports.

Rederi Aktiebolaget Nordstjernans Linie (Johnson Linie), from Stockholm and Göteborg to Mexican, Central and South American ports, both Atlantic and Pacific, San Francisco, Seattle, and Victoria.

Aktiebolaget Sydafrikanska Handelskompaniet, to South African ports, ceased sailings in 1915.

Svenska Ostasiatiska Kompaniets Linie, from Stockholm and Göteborg via the Suez Canal to Indian, Malay, Chinese, Japanese ports and Vladivostok.

Thule Linie, from Göteborg to Newcastle.

Sveabolagets Ångbåtslinie : principally coasting but also from Stockholm to Lubeck.

Förnyade Ångfartygs (Svenska Lloyd), from Göteborg to Antwerp, Rotterdam, Amsterdam, Rouen, Havre, &c.

Ångfartygs Aktiebolaget Norman, from Göteborg to Norwegian ports and Stettin.

Bohusländska Kusten Aktiebolaget : coasting vessels.

Vaxholms Nyångfartygs Aktiebolaget : coasting vessels.

Foreign lines serving Swedish ports include the Wilson Line from London and Grimsby to Malmö and Stockholm, the

Forenede Dampskibsselskab of Copenhagen from Copenhagen to Göteborg.

Shipping between Sweden and foreign countries in 1914 was 25,114,823 tons, of which 12,883,959 tons were Swedish, 5,337,878 tons Danish, 2,986,229 tons German, 2,073,429 tons Norwegian, 817,009 tons British, 612,952 tons Finnish, and 302,948 tons Dutch.

CUSTOM-HOUSE SERVICES

Customs duties have always constituted one of the main sources of Norwegian revenue, in contrast (for example) with the income-tax (p. 128), which was not levied until 1892. The duties may be characterized as moderately protectionist, though in the case of several articles (sugar, coffee, tea, spirits, wine, tobacco) the taxes are purely for revenue. Roughly speaking, cereals are either duty-free or charged at a very low rate, while other agricultural products are dutiable at 10 to 30 per cent. of their value ; raw materials imported for industrial purposes are in many instances admitted duty-free ; duty on articles half manufactured range from 5 to 10 per cent., and on completely manufactured articles from 15 to 30 per cent., of value. In 1915 about 41 per cent. of the total imports by value were subject to duty, and about 59 per cent. were duty-free.

Norway.—Norway is divided into the following custom-house districts and inspectorates with custom-houses in the places named below, and a number of minor stations.

Southern Frontier Custom-district (Det Søndenfjeldske Graen-setold-distrikt).—Custom-houses : Fredrikshald, Fredrikstad, Sarpsborg, Moss, Örje, Kongsvinger, and Hamar, with railway custom-house in Kristiania.

Kristiania Custom-district.—Custom-houses : Kristiania and Dröbak.

Larvik Custom district.—Custom-houses : Drammen, Holmestrand, Horten, Tönsberg, Sandefjord, Larvik, Skien, Brevik, Porsgrund, Langesund, Kragerö.

Kristiansand Custom-district.—Custom-houses : Risör, Tvedestrand, Arendal, Grimstad, Lillesand, Kristiansand, Mandal, Farsund, Flekkefjord.

Stavanger Custom-district.—Custom-houses : Sogndal, Egersund, Sandnes, Stavanger, Skudeneshavn, Kopervik, Hauge-sund.

Bergen Custom-district.—Custom-houses : Bergen, Florö.

Trondhjem Custom-district.—Custom-houses : Aalesund, Molde, Kristiansund, Trondhjem, Røros, Levanger, Stenkjaer, Namsos.

Bodö Custom-inspectorate.—Custom-houses : Mosjöen, Mo, Bodö, Svolvaer, Narvik.

Tromsö Custom-inspectorate.—Custom-houses : Harstad, Tromsö, Hammerfest.

Vadsö Custom-inspectorate.—Custom-houses : Vardö, Vadsö, Kirkenes.

For the purposes of excise (control of spirits, beer, &c.) the country is divided into three districts : (1) Kristiania, Smaale-nenes, and Akershus *amter*, with Drammen and vicinity ; (2) Hedemarkens, Kristians, Romsdals, Søndre Trondhjems, Nordre Trondhjems, Nordlands, Tromsö, and Finmarkens *amter* ; (3) Buskeruds *amt* (excepting Drammen and vicinity), Jarlsberg og Larviks, Bratsbergs, Nedenes, Lister og Mandals, Stavanger, Søndre Bergenhus, and Nordre Bergenhus *amter*.

Sweden.—Both revenue and protective duties are imposed. The revenue duties average about 30 per cent. of the value. The most important is the duty on tobacco ; next in order comes the duty on wine and spirits ; and third, the duty on coffee. The protective duties average about 15 per cent. of the value. Among duties on articles of food the most important are those on cereals, covering all kinds except oats and maize. As regards general industries the most important duties are those on textiles. Export premiums have been abolished, but low export rates have been established for such products as iron and steel, manufactures of iron, machinery, paper, &c.

Sweden is divided into 48 custom-house districts, with custom-houses in the 'staple' towns, as follows :

Norrland division—

Gäfle	Piteå
Haparanda	Skellefteå
Härnösand	Söderhamn
Hudiksvall	Sundsvall
Luleå	Umeå
Örnsköldsvik	

Ostkusten division—

Eskilstuna	Simrishamn
Jönköping	Söderköping
Kalmar	Södertälje
Karlshamn	Sölvesborg
Karlskrona	Stockholm
Kristianstad	Trälleborg
Linköping	Uppsala
Norrköping	Vadstena
Nyköping	Västerås
Örebro	Västervik
Oskarshamn	Visby
Ronneby	Ystad

Västskusten division—

Falkenberg	Lysekil
Göteborg	Malmö
Halmstad	Marstrand
Hälsingborg	Strömstad
Karlstad	Uddevalla
Landskrona	Varberg
Lidköping	

In addition, there are custom-houses in Lund, Borås, Falun, and Östersund, and at the frontier railway stations of Mon (Kristiania-Mellerud line), Charlottenberg (Kristiania-Karlstad line), Storlien (Trondhjem-Bräcke line), and Riksgränsen (Narvik-Boden line). There are also a number of smaller

centres for the customs and frontier-guard services, but of these only those on the frontier have unlimited powers for customs purposes. The coastguard service (*Kustbevakningen*) in the Stockholm custom-house district is under the chief, preventive officer in that city; in Skåne, Blekinge, Halland, and Göteborg och Bohuslän it is under coastguard commanders, and elsewhere it is under the surveyors of customs. The coastguard service has at disposal a coastguard steamer and a number of revenue cutters (mostly motor-boats) and smaller vessels. The frontier-guard service (*gränsbevakningen*) in Dalsland, Värmland, and Dalarna is under a frontier-guard commander, and under surveyors of customs elsewhere.

BRITISH CONSULAR OFFICERS

Norway.—British consular officers are established (January 1, 1918) at the following places in Norway :

[¹ Consul-general. ² Consul. ³ Vice-consul or vice-consuls.
⁴ Pro-consul. ⁵ Consular agent.]

Aalesund ³	Molde ³
Arendal ³	Moss ³
Bergen ^{2, 3, 4}	Namsos ³
Bodö ³	Narvik ³
Drammen ³	Porsgrund ³
Flekkefjord ³	Risör ³
Fredrikshald ³	Sarpsborg ³
Fredrikstad ³	Skien ³
Hammerfest ³	Svolvær (Lofoten Is.) ³
Haugesund ³	Stavanger ^{3, 4}
Kirkenes ³	Tönsberg ^{3, 4}
Kragerö ³	Tromsö ³
Kristiania ^{2, 3, 4}	Trondhjem ^{3, 4}
Kristiansand ^{2, 3}	Vadsö ³
Kristiansund ³	Vardö ³
Larvik and Sandefjord ³	
Mandal ³	

Sweden.—British consular officers are established (January 1, 1918) at the following places in Sweden :

Borgholm ⁵	Norrköping ³
Gäfle ³	Nyköping ³
Göteborg ^{1, 2, 3}	Örnsköldsvik ³
Halmstad ³	Söderhamn ³
Hälsingborg ³	Stockholm ^{2, 3}
Haparanda ³	Sundsvall ^{3, 4}
Hudiksvall ³	Uddevalla ³
Kalmar ³	Varberg ³
Karlskrona ³	Västervik ³
Landskrona ³	Visby (Gotland) ³
Luleå ³	Ystad and Åhus ³
Malmö ^{2, 3, 4}	

CHAPTER XII

ROADS

IN Norway there are still large areas accessible only by roads or tracks, whereas in Sweden, with the exception of Norrland, regular communication by road is relatively unimportant owing to the network of railways and the systems of inland waterways.

There was much activity in road-building in Norway during the second half of the nineteenth century, and the annual cost of building main roads alone was ten times greater in 1890-6 than in 1840-50. Construction has been difficult and expensive owing to the steep declivities from plateaus to deep valleys, the continual outcropping of naked rock, and other physical causes, and some very fine engineering work has been carried out on the great roads, some of which (for those parts where there are no railways) are described below. The Government grants from central funds a large proportion of the cost of building, the remainder being borne by the *amter* (counties) concerned, while each district is charged with the maintenance of the main roads within it, excepting a few frontier and mountain roads. There is a central road administration with a director under the department of public works. Minor or local roads are constructed by the districts, generally with a contribution from county funds, and sometimes from the exchequer. Road-keepers are appointed by the districts in most parts, but the obligation upon farmers of keeping roads in repair survives. Roads carrying heavy traffic are macadamized with layers of stone ; secondary roads are commonly gravelled. It is estimated that on the newer gravel roads from 1,300 to 2,000 lb. per horse can be conveyed, and on the main roads over 2,200 lb. When the roads are in good condition for sleighing, traffic is easier than on the best macadamized surface. The breadth of the great main roads is up to 18 ft., and on

those with less traffic, generally 12 ft. ; in difficult places it is reduced to about 8 ft., with passing-places.

The construction of new roads in Sweden of recent years has been carried on chiefly in Norrland, where railway-communication is most restricted ; in 1909-13 the four northern *läns* absorbed 41 per cent. of the total exchequer grant towards road-building and repair. The county councils of several *läns* also make such grants, but in general the road service is in the care of road-service district administrations, of which, in 1912, there were 370. Road taxes are levied upon landed estate, common woods, and other real property, and on income of capital or work, with certain exemptions. While the general character of roads in Sweden has improved in recent years, the development of motor traffic has led to a demand for further improvement : a Road Association has been formed (1914), and there has been a strong movement in favour of the transference of the entire road service to the State. Under old enactments high roads were ordered to be 6 metres (19½ ft.) wide, and minor roads 11 ft. or less. Many main roads are still only gravelled.

In both countries there is a regular posting system (Norwegian *skyds*, Swedish *skjuts*) in those parts where it is required. It is based on an ancient obligation upon roadside farmers to provide horses and conveyances for travellers in return for a payment fixed by law, but in Sweden over 90 per cent., and in Norway also a large proportion of the posting stations are now worked by contractors or voluntarily. The posting stations, often inns, are established on high roads, usually about 7 to 15 miles apart in Norway and rather more in Sweden where the system exists. There are about 950 stations in Norway and 1,500 in Sweden. A distinction is made in Norway between *faste skydsstationer* (fixed posting stations) and *tilsigelsestationer* (stations where notice must be given), commonly described in English as 'fast' and 'slow' stations respectively. At the fixed stations, which are the most numerous, the proprietors are bound to have a fixed number of horses immediately available. The other stations are con-

fined to remote districts. The typical vehicles in Norway are the two-wheeled *stolkjærre* with seats for two passengers, and *kariol* for one passenger, but two-horsed four-wheeled carriages (*kalesjevogn*, landau) have in recent times become common, and are in general use in Sweden also. There are fixed tariffs for *faste* and *tilsigelse* stations (the latter somewhat lower) throughout Norway; in Sweden tariffs vary in different *län*s. Charges are rated per kilometre and according to the number of passengers, but on difficult stages a payment based on a number of kilometres greater than the actual distance may be legal.

A posting system similar to that on the roads is applied also on lakes where these form lines of communication, certain stations being compelled to provide boats and rowers at fixed tariffs.

Public motor services have been established on a number of country roads in recent years, especially in Norway. The following table gives, for each *amt* in Norway, the total number of motor cars and cycles registered, the number and length of routes on which public services were maintained, and the number of cars maintaining them, on December 31, 1917 :

<i>Amt.</i>	<i>Pas- senger Cars.</i>	<i>Mer- cantile Cars.</i>	<i>Motor cycles.</i>	<i>Public motor services.</i>	<i>Length, miles.</i>	<i>Cars engaged.</i>
Smaalenene . . .	123	11	85	2	35	3
Akershus . . .	279	30	225	3	35	4
Kristiania . . .	534	256	345	—	—	—
Hedemarken . . .	184	8	181	9	238	11
Kristians . . .	150	11	148	10	371	61
Buskerud . . .	173	13	191	6	240	24
Jarlsberg and Larvik . . .	181	23	69	3	42	4
Bratsberg . . .	101	8	50	10	282	19
Nedenes . . .	49	—	9	—	—	—
Lister and Mandal . . .	72	1	31	3	133	5
Stavanger . . .	154	33	58	5	60	11
Søndre Bergenhus . . .	51	5	18	7	161	21
Bergen . . .	163	86	36	—	—	—
Nordre Bergenhus . . .	11	4	—	9	281	30
Romsdal . . .	79	7	10	8	153	37
Søndre Trondhjem . . .	120	53	45	10	312	24
Nordre Trondhjem . . .	47	4	43	4	155	12
Nordland . . .	29	5	5	1	16	1
Tromsø . . .	8	2	1	3	87	3
Finmarken . . .	—	—	—	—	—	—

The total number of passenger cars was 2,508, of mercantile cars 560, of motor cycles 1,550 (193 with side cars), and of public cars 270. It would appear that a number of the public services, however, are summer services only.

Similar particulars are not available for Sweden.

The total length of main roads in Sweden in 1915 was 11,866 miles, and of secondary roads 27,300 miles. They were distributed between the various *läns* as follows, the first figure being that of main roads and the second that of secondary roads in each case : Stockholm, 380 and 1,024 miles ; Uppsala, 316 and 877 miles ; Södermanland, 436 and 996 miles ; Östergötland, 504 and 1,934 miles ; Jönköping, 350 and 1,995 miles ; Kronoberg, 344 and 1,547 miles ; Kalmar, 567 and 1,493 miles ; Gotland (island), 313 and 522 miles ; Blekinge, 133 and 546 miles ; Kristianstad, 387 and 1,331 miles ; Malmöhus, 374 and 1,589 miles ; Halland, 302 and 773 miles ; Göteborg och Bohus, 250 and 693 miles ; Älvsborg, 844 and 1,778 miles ; Skaraborg, 1,020 and 1,105 miles ; Värmland, 889 and 1,200 miles ; Örebro, 571 and 823 miles ; Västmanland, 485 and 765 miles ; Kopparberg, 875 and 807 miles ; Gäfleborg, 210 and 1,168 miles ; Västernorrland, 400 and 1,233 miles ; Jämtland, 560 and 850 miles ; Västerbotten, 1,096 and 667 miles ; Norrbotten, 360 and 1,584 miles.

Similar particulars for Norway are not complete. The total length of main roads is about 6,000 miles, and of secondary roads 11,000 miles. Figures are available for the following *amter*, but they are not all for the same year and must therefore be regarded as approximations only ; moreover, figures are wanting for the *amter* of Akershus, Smaalenene, Stavanger, and Søndre Bergenhush, in the two first of which there is an unusually complete network of roads. The available figures are as follows, the first being that of main roads and the second that of secondary roads in each case : Hedemarken, 612 and 1,093 miles ; Kristians, 643 and 660 miles ; Jarlsberg and Larvik, 234 and 430 miles ; Bratsberg, 439 and 666 miles ; Nedenes, 379 and 466 miles ; Lister and Mandal, 249 and 692 miles ; Nordre Bergenhush, 261 and 439 miles ; Romsdal,

473 and 1,429 miles ; Søndre Trondhjem, 408 and 663 miles ; Nordre Trondhjem, 370 and 985 miles ; Nordland, 470 and 402 miles ; Tromsø, 4 and 288 miles ; Finmarken, 88 and 55 miles.

In Norway there are on an average about $13\frac{1}{2}$ miles of road per 100 square miles of territory, and in Sweden about $22\frac{1}{2}$ miles, but there are great local variations, especially as between south and north in both countries ; thus Norrbotten *län* in Sweden has $4\frac{3}{4}$ miles, and Finmarken *amt* in Norway little over $\frac{3}{4}$ mile of road per 100 square miles.

The following sections refer in detail only to those main roads which form arteries of through communication, in the absence of railways ; such main roads are found principally in Norway, and in the inland parts of central Sweden, towards the frontier.

A.—THE SOUTH COAST AND SOUTHERN NORWAY

In that part of southern Norway which surrounds Kristiania-fjord, and in the district which extends from Kristiania northward roughly to Hamar, there is a network of roads connecting all important points, but as this part is also fairly supplied with railways the roads are of merely local importance, and will not be detailed here.

Similarly along the coast, a main road or series of roads connect all the important ports from Fredrikshald and Fredrikstad to Kristiania, and from Kristiania all round the south coast and as far as Stavanger, where it stops. This road, from Kristiania and Drammen, is known as the Vestland trunk road, and runs by Sande to Holmestrand, thence to Larvik (with branches from Horten and Tönsberg), thence directly to Eidanger (where there is a branch to Porsgrund and Skien) thence southward to Brevik, where there is a ferry to Stathelle beyond which the road continues (with branches from Lange-sund, Kragerö, and Risör) to Arendal, Grimstad, Lillesand; Kristiansand, Mandal, Lyngdal, and Flekkefjord. Thus far the road, though serving the ports mentioned, does not for the most part run close to the coast, and from Flekkefjord it

runs wholly inland via Eide (with a branch from Sogndal), Helleland (with a branch from Egersund), and Birkrem to Sandnes and Stavanger. In some portions this road is only gravelled, and it does not provide a regular posting route throughout, as over considerable sections (Kristiania-Skien, Arendal-Grimstad, Flekkefjord-Stavanger) there are railways, and in general, though there are local motor services (e. g. Kristiansand-Aaseral) the coastwise sea-communications are more important. Here again, therefore, the road connexions will not be further detailed.

From the principal ports along the south coast—Drammen, Larvik, Skien, Kragerø, Arendal, Kristiansand, Mandal, Flekkefjord, Egersund, and other smaller places—there are roads up the valleys at whose mouths these places are situated. Of these roads, those which run through to the great road from the Hardanger to Kongsberg, &c., are described below. Of the others the Saetersdal road is the most important, and is also referred to below, but neither this nor any of the others affords communication to the north or west, except by fjeld tracks.

All roads detailed below, unless otherwise stated, have *faste skydsstationer* or fixed posting stations (see p. 210).

Figures thus—488 ft.—represent elevation above sea-level.

Route i.—*Drammen to Kongsberg*

From Drammen (with connexion from Kristiania, &c.) there is a road up the Dramselv to Eker and thence SW. to Kongsberg. It follows the railway closely (see Appendix II, Route 95). For road connexions at Kongsberg see Routes ii, vi, vii. This route, coinciding with a railway, has not fixed posting-stations.

Route ii.—*Larvik, &c., to Kongsberg*

From Larvik a main road, with by-road connexions from Tönsberg, Horten, and Holmestrand on the coast to the northward, runs up the valley of the Laagen by (10 m.) Gjöne, (23 m.) Honevold, (35 m.) Vittingfos, terminus of a railway

from Holmestrand (Appendix II, Route 96), and (44 m.) Vidnes, to (56½ m.) junction with the road from Hardanger and Notodden (Route vi), and (59 m.) Kongsberg, 488 ft. (see Routes i, vi, vii, and for railway, Appendix II, Route 95).

Route iii.—*Skien, &c., to Notodden and to Siljord*

From Skien (with connexions from Larvik, Brevik, Porsgrund, &c.) a road runs up the west side of Nordsjön. (18 m.) Ulefos, whence Bandak-Nordsjö canal and lake route runs west. (22 m.) Aarnes. (27 m.) Faröen (Gvarv : see below). (31 m.) Akkerhaugen, at head of Nordsjön. Road runs thence via (35 m.) Farvolden to the foot of Hitterdalsvand, and along its east shore to (45 m.) Notodden, 50 ft. (for Kongsberg, Tinnoset, &c. ; see Route vi ; for railway to Tinnoset, Appendix II, Route 94).

Steamers follow the lakes and the river connecting them along this route from Skien to Notodden ; the slow vessels call at the intermediate stations of Löveid, Ulefos, Aarnes, Akkerhaugen, Kalhuset, Farvolden, Nautesund, and Juksebö.

From (27 m.) Faröen, above, a road branches W. by N. up the valley leading to Lake Siljord (steamers in summer ?), of which it follows the south shore, and at (51 m.) Siljord, 384 ft., at the head of the lake, joins the Hardanger-Kongsberg road (Route vi).

Route iv.—*Arendal, &c., to the Hardanger-Kongsberg Road*

There is rail connexion (see Appendix II, Route 98) from Arendal and from Grimstad to Tveitsund ; also road connexions from these points and from Risör, Tvedestrand, Lillesand, &c.

From Tveitsund road continues along E. bank of Nisservand (steamers). (11 m.) Vik i Nisserdal. (21½ m.) Strand i Vraadal. (26 m.) Hvideseid (Smedodden) on Bandak-Nordsjön steamer route, whence road continues N. to (33 m.) Brunkebergs-Kirke on Hardanger-Kongsberg road (Route vi at m. 131½).

A road westward from (21½ m.) Strand i Vraadal gives access to (42 m.) Midtgaarden, (48 m.) Skafse, and (51 m.) Dalen (see Route vi).

Route v.—*Kristiansand to the Saetersdal*

There is railway (Appendix II, Route 100) and road connexion northward from Kristiansand to Byglandsfjord at S. end of Lake Byglandsfjord (steamers). Distance from that point : (11 m.) Ose, at the head of the lake, the northern part of which is called Aaraksfjord. Road continues N. up valley of Otteraaen. (21½ m.) Besteland. (35¼ m.) Viken i Valle. (42¾ m.) Flateland. (63 m.) Byklum, 1,800 ft. At this point the main road ceases, and there are only fjeld tracks out of the head of the Saetersdal.

B.—WESTERN NORWAY

It is characteristic of the great roads of western Norway that in conformity with the relief of the land they ascend to high elevations within a short distance of sea-level at the heads of the fjords from which they start, as will appear from the elevations quoted in the following descriptions. Very steep gradients are sometimes involved, although the engineering of the modern roads is excellent as a rule, and much has been done to replace the more difficult sections of the older roads.

Route vi.—*The Hardanger Fjord to Kongsberg (Telemarken Road), and Connexions*

A main road starts from Odda at the head of Sörfjord, a southern branch of Hardangerfjord, and runs at first south up the valley of the Aabo. (6¼ m.) Hildal, 328 ft. The Aabo valley is quitted at (10½ m.) Jösendal, where a narrow road joins from the west from Fjaere (11 m.) at the head of Aakrefjord. Main road now winds up wooded gorge of Seljestadjuvet, ascending sharply, to (14¼ m.) Seljestad, 2,028 ft. A further ascent in zigzags is followed by a relatively level stretch to (19¾ m.) an elevation of 3,393 ft., beyond which the Horrebekke is descended in windings to (24¾ m.) Breifond, close to Lake Röldalsvand, 1,223 ft.

At Breifond the road is joined by a main road from the south, which ascends the gorge of Bratlandsdal from Nes

(15 m.), 236 ft., at the head of Suldalsvand. Communication along this lake is by small steamers and boats; there is no road along its shores, but to Osen at its foot there is a main road up the Logen valley from Sand (12 m.) on Sandsfjord.

The main road from Breifond proceeds generally easterly along Röldalsvand to (28 m.) Röldal, 1,224 ft. From this point it ascends the steep valley of the Vasdalselv, but leaves it about m. 32 and presently ascends further by long zigzags. At the head of these a stony tract, above the limit of trees, where patches of snow lie all the year, is crossed to (37½ m.) the watershed at an elevation of 3,715 ft. Beyond this the road, descending slightly, passes through a tunnel under a permanent snowfield. Stakes indicate the line of the road when it is covered with snow in winter. (46¾ m.) Haukeli-saeter. A long steady descent follows, and the tree-line is reached again. (58 m.) Botten, 2,587 ft. (68 m.) Haukeli hotel, 1,870 ft. (75½ m.) Rui, 1,590 ft. Hereabouts road is rather rough. (83 m.) Junction of road to Dalen.

The Dalen road, running generally S. and then SE., ascends winding, and then descends gradually to (88½ m.) Börte, (94½ m.) Moen, and (104 m.) Dalen, 236 ft., at the head of Bandaksvand, by which and the Bandak-Nordsjön canal there is steamer communication with Skien. Road from Tveitsund, Arendal, &c.: see Route iv.

The main road, from m. 83, proceeds E. to (84 m.) Heggstöl, and continues very hilly to (91½ m.) Mule.

At (93½ m.) Aamot an alternative route to (105½ m.) Dalen branches S.

Main road now rises over high hills and descends to (118 m.) Mogen, whence a road diverges S. to (125 m.) Laurdal on Bandaksvand. Main road continues to (130 m.) Hemmes-tveit, about 1,390 ft., and (131½ m.) Brunkebergs-Kirke, whence a road branches S. to (133½ m.) Hvideseid-Kirkebø and (138½ m.) Hvideseid (Smedodden) on Lake Hvidesjön and the Bandak-Nordsjön steamer route. Road from Tveitsund, Arendal, &c.: see Route iv.

Main road continues: (140 m.) Kobbervolden. (141 m.)

Siljord, 384 ft. Road from Skien and Ulefos : see Route 3. (148 m.) Flatdal. Zigzag ascent to the watershed of the Hjaerdal, and gradual descent of that valley. (153½ m.) Skovheim, 500 ft. (165 m.) Lövheim.

From m. 168½ there are alternative roads to Kongsberg.

(A) Via Notodden, eastward. (178½ m.) Notodden, 50 ft., on Hitterdalsvand ; electro-chemical works on the Tinelv ; railway to Tinnoset, see Appendix II, Route 94. Hence the road, on which there is a motor service, ascends to an undulating plateau (summit, 1,476 ft.) and then descends the wooded Medheia to (193½ m.) junction with the road from Larvik, &c. (Route ii) and (196 m.) Kongsberg, 488 ft., railway terminus (see Appendix II, Routes 89, 95).

(B) Via Bolkesjö, northward and eastward. Road ascends the Örvalla and crosses to the Tinelv valley at (174½ m.) Gransherred.

Here a road branches N. to (177½ m.) Tinnoset, at the foot of Lake Tinsjön, along which, by steamer, lies the route to Rollag, for the electric railway to Saaheim and the electro-chemical and power works of Rjukan ; see Appendix II, Route 94.

The Kongsberg road, crossing the Notodden-Tinnoset railway and the Tinelv, ascends rapidly and crosses hills to (188½ m.) Bolkesjö sanatorium, 1,286 ft., and reaches its highest point at 1,791 ft. ; thence it descends the Jondal to the Numedal, in which at m. 200½ the Kongsberg-Gjeilo road (Route vii) is joined, and followed to (203½ m.) Kongsberg (see above).

Route vii.—*Kongsberg through Numedal to Gjeilo*

Motor car service in summer to Brösterud or Gjeilo.

From Kongsberg, 488 ft., road runs generally NW. up the Numedal, the upper valley of the Laagen river. (3 m.) Bolkesjö and Hardanger road (Route 6) branches W. (10½ m.) Svennesund. (19¼ m.) Flesberg. (29¼ m.) Alfstad. (39¼ m.) Helle. Road ascends and descends to E. bank of a lake, Ytre Norefjord or Kravikfjord, 868 ft., and beyond this another, Övre Norefjord. Beyond the head of this lake is (56 m.) Skjønne, 947 ft. Leaving the Laagen, road enters the Opdal

and ascends steeply to Lake Fennebufjord ; (63 m.) Liverud, 1,568 ft., at its W. end. (76 m.) Brösterud, 2,625 ft. After a further ascent road winds down the Saeterdal to (86½ m.) Kjönaas, 2,838 ft. Further ascent over the Halvardshö and descent into the Skurdal ; ascent thence to (102½ m.) Gjeilo, 2,604 ft., station on Kristiania-Bergen railway (Appendix II, Route 92).

Route viii.—*Bergen to Hardangerfjord*

The shortest land route between Bergen and the Hardangerfjord is provided by the Kristiania railway (Appendix II, Route 92) as far as Trengereid (25 m.), and thence a main road to Norheimsund, as follows. Road winds up to a high plateau, which it crosses, and then descends to (7 m.) Aadland on an arm of Samnangerfjord. Thence it passes near (12 m.) Tysse, beyond which it ascends a gorge in long curves to (19½ m.) Ekeland, 1,296 ft. Crossing a marshy plateau, at m. 25¾ road dips suddenly into ravine of Tokagjelet, being finely engineered down a precipitous rock-face and through two tunnels. (40 m.) Norheimsund or Sandven, on the Norheimsund inlet of Hardangerfjord, 65 m. in all from Bergen.

Route ix.—*Hardangerfjord to Sognefjord*

From Eide on Gravensfjord, an arm of Hardangerfjord, road ascends rocky ravine of the Gravenselv past Gravensvand to (5 m.) Övre Vasenden or Seim, 96 ft.

Here a road from eastward joins from Ulvik, on Ulvikfjord near the head of Hardangerfjord, 13¾ m. Between Ulvik and Övre Vasenden this road ascends to an elevation of 1,125 ft.

From Övre Vasenden the winding road steeply ascends ravine of Skjervet, and then more gradually to (11¼ m. from Eide) an elevation of 860 ft., thence descending easily to (18¾ m.) Voss or Vossevangen, 187 ft., on the Kristiania-Bergen railway (Appendix II, Route 92). Gradual ascent through woods and grassland to (26¼ m.) Tvinde or Tvinne, 312 ft. ; then steeper to (32½ m.) Vinje i Vossestrand, 738 ft. Thence upward through a ravine and across watershed to the Naerödal-

selv and ($41\frac{1}{2}$ m.) Stalheim hotel, 1,122 ft., at the head of Stalheimsklev (cliff), down which road proceeds in 16 steep zigzags to the deep Naerödal. ($48\frac{3}{4}$ m.) Gudvangen, in Naerödal, at head of Naeröfjord, a branch of Aurlandsfjord, which is itself a branch of Sognefjord.

Route x.—*Sognefjord (Laerdalsören) to Gol, &c.*

A motor service has been maintained in summer on this road between Laerdalsören and Maristuen (Route xi) and between Maristuen and Gol.

From Laerdalsören road runs to (7 m.) Blaaflaten, and then ascends through rocky ravine to (16 m.) Husum, 1,070 ft. Further ascent through gorges of Grimsöigel and Svartegjel. ($18\frac{1}{2}$ m.) Borgund *stavekirke* (ancient timber church). Valley is more open and nearly level. (24 m.) Hegg, 1,483 ft. ($26\frac{1}{2}$ m.) Road to Maristuen and Fagernes (Route 11) branches E. here. Gol road runs SE. ($31\frac{1}{2}$ m.) Breistolen. Between this and the following station road reaches an extreme elevation of 3,789 ft. in a bleak, barren district. ($40\frac{3}{4}$ m.) Bjöberg, 3,323 ft. The descent towards Gol is steep in parts, and the road generally is rather hilly. ($69\frac{1}{4}$ m.) Löttegaard, 1,440 ft. ($78\frac{1}{2}$ m.) Gol, 679 ft. Station on Kristiania-Bergen railway (Appendix II, Route 92). The road continues along the railway, following it more or less closely to Hönefos, and ultimately to Kristiania, &c.; since the construction of the railway the road has lost its importance for through communications.

Route xi.—*Sognefjord (Laerdalsören) to Fagernes (Valdres), Hönefos, &c.*

A motor service has been maintained in summer on this road between Laerdalsören and Fagernes: time, $11\frac{1}{2}$ hrs. An old road follows in several parts a course divergent from that of the modern road, and the telegraph line sometimes follows the old road.

From Laerdalsören the route coincides with Route x as far as m. $26\frac{1}{2}$, where the Gol road diverges SE. Thence a rapid

ascent to (31 m.) Maristuen, 2,635 ft. Road ascends past limit of trees to (41½ m.) summit, 3,296 ft., on the open, barren Fillefjeld. (42½ m.) Nystuen, 3,255 ft. Beyond this there is a generally steady descent. The tree-line is reached (birch woods) above (49½ m.) Skogstad, 1,883 ft.; beyond this there is a somewhat steeper descent. (60 m.) Grindaheim, 1,529 ft. The road along Lake Vangsmjösen is partly hewn out of rock, and falling stones are dangerous in spring and autumn; at one point road is roofed on this account. (66½ m.) Öilo, 1,477 ft. (75½ m.) Löken, 1,280 ft. (84¼ m.) Fosheim, 1,214 ft. (93½ m.) Fagernes, 1,188 ft. From this point road runs alongside railway (Appendix II, Route 93), which it follows closely, except in the vicinity of Lake Randsfjord, all the way to Kristiania.

Near (105½ m.) Björgo station, 1,673 ft., a road diverges SE. along the Baegna valley via (112¼ m.) Fjeldheim and (134 m.) Sörum to (142 m.) Granum at the head of Lake Spirillen, 495 ft.; (160 m.) Bergsund; (169 m.) Hen railway station (Appendix II, Route 95); and (173½ m.) Hönefos, railway station (Appendix II, Routes 92, 95). Summer motor service between Fagernes and Sörum (or Granum); steamer service between Sörum (or Granum in low water) and Hen (or Bergsund in low water). From Hönefos there is road as well as rail connexion with Kristiania, Drammen, &c.

Route xii.—*Sognefjord (Vadheim) to Nordfjord (Sandene and Utviken)*

A motor car service has been worked on this road.

From Vadheim, on Vadheimsfjord, a hilly road runs up Vadheimsdal. (10 m.) Sande. Branch road W. and NW. down Holmedal to Eidevik, a 'slow' *skydsstation*, and Sveen at the head of Dalsfjord. Main road continues to (17½ m.) Lange-land. Another branch road W. to Sveen. About m. 19½ main road reaches its highest point, 1,119 ft., and then winds down a valley to (26½ m.) Förde (sea-level), on Fördefjord. Söndfjord district, of which Förde is the principal village, is noted for its horses. Road now ascends valley of the Jölsterelv, fertile and wooded. (39 m.) Nedre Vasenden, (56 m.) Klagegg,

741 ft. Road turns into the narrow Vaatedal. (64½ m.) Egge i Vaatedalen, 558 ft.

(70 m.) A poor road branches N., ascending to 2,074 ft., and descending thence by zigzags very steeply, to (82½ m.) Utviken on Indvikfjord, the upper part of Nordfjord.

Main road continues to (72½ m.) Red (Bredheim), on Bredheimsvand, along which it runs hewn in the rocky shore and in parts buttressed with masonry. Slight ascent beyond lake, followed by descent to (81 m.) Sandene or Gloppen on Gloppen-fjord, a southern arm of Nordfjord.

Route xiii.—*Nordfjord to Jörundfjord and Sunelvsfjord*

The main road from the Nordfjord to the Jörundfjord and Sunelvsfjord starts from Faleide on the north shore towards the head, but there is a road along the fjord from Oldören, Loen, &c., at the head. Road is hilly and difficult almost throughout.

From Faleide road after 1½ m. rises in steep windings to 800 ft., and continues hilly to (7½ m.) Kjös and (11½ m.) Grodaas on Hornindalsvand. Thence a very steep ascent of the Hornindal to (16¾ m.) Indre Haugen and (20½ m.) Kjelstadli, 1,391 ft. Descent by Sundal valley. (26½ m.) Road forks, NE. to (28½ m.) Hellesylt on Sunelvsfjord; NW. to (30¾ m.) Fibelstad-Haugen, 1,214 ft., whence road descends the wild Norangdal to (39½ m.) Öie at the head of Norangfjord, an arm of Jörundfjord.

Route xiv.—*Nordfjord and Sunelvs (Geiranger) fjord to Otta*

There is no through main road from Nordfjord to the interior. A road from Visnaes, on the north shore between Faleide and Loen, runs up Stryndal to (7 m.) Mindre Sunde at the lower end of Strynsvand, along which communication is by boat (motor boats). From Hjelle, 69 ft., at the head of the lake, a road ascends for the most part very steeply to (9½ m.) Videsaeter, and about m. 13 reaches a height of 3,800 ft. (27 m.) Grotlid, 2,888 ft. (see below).

From Marok at the head of Geirangerfjord, an arm of Sunelvsfjord, road ascends abruptly in curves and zigzags to (10½ m.) Djupvashytte, which is only about 3½ m. from Marok in a direct line, but the ascent is from sea-level to 3,405 ft. Road proceeds over bleak fjeld to (25½ m.) Grotlid, 2,888 ft. (see above).

Thence a general descent for the rest of the way, down Billingsdal and Ottadal to Otta. The descent is steepest between Polfossen and Flaeköf. There are several stations along the road in addition to those named. (38 m.) Polfossen, 1,930 ft. (51 m.) Flaeköi. (64¾ m.) Fossheim (Lom), 1,295 ft. (87 m.) Sörum, 1,135 ft. (105 m.) Otta, 994 ft. Thence there is road and rail connexion with Lillehammer, Hamar, Kristiania, &c. : for the railway see Appendix II, Route 90 ; for a note on the road, Route xviii A.

Route xv.—*Romsdalsfjord to Dombaas (Romsdal route)*

Although there is no through road from either Aalesund or Molde, the two chief ports nearest to Romsdalsfjord, good roads run from both to fjord-side points not far from Veblungsnes and Aandalsnes at the mouth of Romsdal.

A motor service has been worked in summer on this route.

From Aandalsnes (or Nes) on Romsdalsfjord a road runs up the Romsdal, the valley of the Rauma river, uniting at m. 1½ with a road from Veblungsnes (2 m.) on the same fjord. Open wooded valley, at first fairly level, but flanked by high steep mountains ; road subject to avalanches at some points in winter. (16¼ m.) Flatmark. Rapid ascent. (23 m.) Ormeim. Winding ascent of Björneklev (cliff), high above the Rauma. (29¼ m.) Stueflaaten, 2,051 ft. (37¼ m.) Mölmen, 2,005 ft. (44¾ m.) Lesjeverk, 2,090 ft., on Lesjekogensvand, from which the Rauma river drains north-westward to Romsdalsfjord and the Lougen south-eastward, its waters ultimately reaching the Glommen and the Skagerak. (60¼ m.) Holaaker, 1,720 ft. (67¾ m.) Dombaas, 2,110 ft., above the Lougen. Junction of road from the north : see Route 16. Thence there is road and

rail connexion with Otta, Lillehammer, Hamar, Kristiania, &c. For the railway see Appendix II, Route 90 : for a note on the road, Route xviii A.

Route xvi.—*Sundalsfjord (Sundalsören) to Dombaas, Lille Elvedal, Tønset, and Stören*

This road, and branches, may be conveniently dealt with in sections.

(A) A motor service is worked between Sundalsören and Aune in 4 hrs.

From Sundalsören, at the head of Sundalsfjord and the mouth of the Sundalselv, road ascends the valley. There is danger of avalanches at some points beneath steep slopes. Ascent is steep in parts. (12 m.) Storfafe. (22½ m.) Gjöra. A little farther on is a very steep rough ascent above gorge of the river. (28¾ m.) Sliper, 1,804 ft. (38 m.) Aalbu, 1,740 ft. (45 m.) Aune, 1,775 ft. This is on the main road across the Dovrefjeld, which used to be the principal route between Kristiania and Trondhjem. This road will be described southward from Aune to Dombaas, and northward from Aune to Stören, with branches.

(B) From Aune, 1,775 ft., southward : (13½ m.) Drivstuen, 2,231 ft. Ascent of narrow ravine of Driva river to the high plateau of Dovrefjeld, which is followed beyond Fogstuen (below). (22¾ m.) Kongsvold, 2,982 ft. Sanatorium and winter sports station. A short distance farther the summit level of the road is reached at 3,353 ft. (29 m.) Jerkin, 3,091 ft. Sanatorium. The Foldal road branches off here : see (C) below. (42 m.) Fogstuen, 3,222 ft. Sanatorium. Steep descent over boggy moorland and through stunted pines. (48¼ m.) Dombaas, 2,110 ft. See Route 15. Total distance from Sundalsören, 93¼ m.

(C) From Jerkin, 3,091 ft., the Foldal road runs east down that valley, descending fairly steadily all the way. (19 m.) Foldal. Copper mines. A motor service is worked between this point and Lille Elvedal, in 2 hrs. (46 m.) Lille Elvedal, 1,660 ft., station on Kristiania-Trondhjem railway (Appendix

II, Route 88). Total distance from Aune, 75 m.; from Sundalsören, 120 m.

(D) From Aune, 1,775 ft., northward : road leaves Driva valley and crosses a low divide into that of the Orkla. ($8\frac{3}{4}$ m.) Stuen or Nystuen, 1,759 ft. Descent to Orkla river, which is followed ; then ascent to ($15\frac{3}{4}$ m.) Austbjerg or Ulshjerg, 1,372 ft. Branch road to Tönset : see (E) below. Road ascends, skirting deep ravine of the Orkla. ($23\frac{1}{4}$ m.) Bjerkaker or Birkaaker, 1,401 ft. Road to Lökken, Stangvik, &c., branches off here : see Route xvii. Stören road leads through the marshy Soknedal. ($30\frac{3}{4}$ m.) Garli, 1,145 ft. Road follows narrow valley of the Sokna past (37 m.) Praesthus, 702 ft., to the Gula valley and ($45\frac{3}{4}$ m.) Stören, 210 ft., station on Kristiania-Trondhjem railway (Appendix II, Route 88). Total distance from Sundalsören, $90\frac{3}{4}$ m.

(E) From Austbjerg, 1,372 ft., road to Tönset runs SE. It ascends at first, rather steeply in parts, as far as ($23\frac{1}{2}$ m.) Stöen i Kvikne, where a low watershed is crossed, and the valley of a tributary to the Glommen is descended to (47 m.) Tönset, 1,620 ft., station on Kristiania-Trondhjem railway (Appendix II, Route 88). Total distance from Aune, $62\frac{3}{4}$ m. ; from Sundalsören, $107\frac{3}{4}$ m.

Route xvii.—*Halsefjord (Stangvik and Surendalsören) to Bjerkaker and to Trondhjem*

A road connects Stangvik with ($10\frac{1}{2}$ m.) Surendalsören, both stations on inner arms of the Halsefjord, which opens behind the port of Kristiansund. Good road up the Surendal. ($15\frac{1}{2}$ m.) Honstad, 74 ft. (28 m.) Rindalen, 469 ft. Low watershed is crossed to Orkla valley at ($32\frac{1}{4}$ m.) Garberg ; in the valley at ($36\frac{1}{2}$ m.) Storaas the road divides—

(A) South-eastward up the Orkla valley to ($42\frac{3}{4}$ m.) Kalstad, 463 ft., whence a road leads N. to Lökken ($5\frac{1}{2}$ m.), copper mines, terminus of railway to Thamshavn (Appendix II, Route 86). Main road continues to ($58\frac{1}{4}$ m.) Haarstad, 722 ft., and, with a final curving ascent of 620 ft. from the valley, to ($67\frac{1}{2}$ m.) Bjerkaker, 1,401 ft. See Route xvi (D).

(B) Northward (from Storaas, above) down to Orkla valley to (44½ m.) Svorkmo on the Thamshavn railway (Appendix II, Route 86), whence road continues parallel to railway to (56½ m.) Orkedalsören, and thence along shores of Orkedalsfjord and Gulosen, inlets of Trondhjemsfjord, to (82 m.) Trondhjem.

Route xviii (A, B).—*Kristiania to Trondhjem*

There are two main roads between Kristiania and Trondhjem. They will not be dealt with in detail here, as they have been in great part superseded for through communications by railways, though at an earlier period they were two of the most important roads in the kingdom.

(A) The western or Gudbrandsdal route runs from Kristiania north to Lake Mjösen. There are branches along both the east and the west shores of this lake, the former passing Hamar and Lillehammer, and the latter Gjøvik. Thence the road runs up Gudbrandsdal to Otta, where Route xiv joins from the west, and Dombaas, where the railway (Appendix II, Route 90) stops, and the Romsdal route (xv) joins from the west. Beyond Dombaas the road runs by Jerkin, Aune, Austbjerg, and Stören, and has been already described (Route xvi B, reversed, and D). At Stören it joins Route B, below, and follows the railway (Appendix II, Route 88) into Trondhjem.

(B) The eastern route follows the river Glommen and the railway (Appendix II, Routes 65, 89, 88). Beyond Kongsvinger there are parallel roads, one on each side of the valley, as far as Elverum. At Koppang the road leaves the railway, crossing from the Glommen valley to the Rendal, and following that valley northward. At Tönset the railway is rejoined, and one branch continues NE. along its route via Röros and Stören (Appendix II, Route 88) to Trondhjem. Another runs NW., as described in Route xvi E (reversed) to Austbjerg, where it joins Route A, above.

From this road there branch off eastward the successive roads across the frontier described in Routes xxv–xxix.

Route xix.—*Trondhjem and Stenkjaer to Rödhammer (for Namsos) and Formofos*

There is a main road east from Trondhjem following the railway to Hell, and thence (i) the main line to Meraker (but not across the frontier), and also (ii) the branch line northward via Levanger and Vaerdal (see Route 30) to the head of Trondhjemsfjord at Stenkjaer. For these railways, see Appendix II, Routes 82, 87.

(A) From Stenkjaer a road runs N. for 3 m., and then branches left and NW. from the Formofos road (B, below), and reaching by easy gradients an elevation of 300 ft. descends to the head of Lyngsfjord, an arm of Namsenfjord, at (30 m.) Rödhammer, whence usual route is by steamer to Namsos. Motor service between Stenkjaer and Rödhammer in $2\frac{3}{4}$ hrs. Road continues along shore of fjord to Spillum, opposite Namsos.

(B) From Stenkjaer road runs N. for 3 m. as stated above, and then branches right and NE. from the Rödhammer road, to (6 m.) Sunnan, railway terminus. Thence along N. bank of Snaasenvand (steamers) to a point near (33 m.) Sem at the head of the lake. Thence road runs N. to ($47\frac{1}{4}$ m.) Formofos, near which the road from Namsos to the frontier (Route xxxi) is joined.

C.—SOUTH-EASTERN NORWAY AND WESTERN SWEDEN : MAIN
ROADS ACROSS FRONTIER

The main roads across the frontier will be described in the direction from Norway to Sweden, and, in general, from the point where they leave a railway in Norway to that at which they reach one in Sweden.

Route xx

A road from Sarpsborg (Kristiania, &c.) follows the Fredrikshald railway (Appendix II, Route 64) closely as far as Berg, the station before Fredrikshald, and there diverges SW. to ($2\frac{1}{2}$ m.) the frontier and Svinesund, Swedish customs

post, running thence S. to (14 m.) Stromstad port. Thence it follows pretty closely the railway from Stromstad southward (Appendix II, Route 62).

Route xxi

The railway southward from Fredrikshald (Appendix II, Route 64) is followed closely by a main road to and across the frontier at Kornsjö.

Route xxii

From Fredrikshald a road runs eastward by (2½ m.) Tistedalen, 270 ft., to (11 m.) Holmegaard, (13 m.) the frontier and Stommen, Swedish customs post, (15½ m.) Nössemark, 340 ft., on Lake Stora Le, across which there is a ferry to Sund, and thence a main road to (18 m.) Bengtsfors, 305 ft., railway station (Appendix II, Route 63) and the district westward of Lake Vänern. Another road runs S. along W. shore of Stora Le to (33 m.) Ed, 360 ft., railway station (Appendix II, Route 64).

Route xxiii

A road from Kristiania, &c. branches away from the Ski-Sarpsborg railway (Appendix II, Route 64) at Mysen, 400 ft., and runs E. Distances from Mysen: (10½ m.) Kallak, (15½ m.) Böen, (19 m.) frontier, (21 m.) Hån, Swedish customs post, (24 m.) Töcksmark, 330 ft. on Lake Foxen. Beyond this roads lead in various directions through district westward of Lake Vänern.

Route xxiv

A main road runs along or near the railway from Kristiania to Kongsvinger, 483 ft. (Route 18 B), and thence southward to Charlottenberg and beyond. For the railway see Appendix II, Route 65. From this road, at Skotterud station, 5½ m. from the frontier on the Norwegian side, a main road branches SW. via Vestmarken to (10 m.) the frontier and Högsäter, 410 ft., Swedish customs post. Thence it runs S. via (17 m.) Skillingmark, 397 ft., and communicates by

various branches southward with Töcksmark (Route 23) and places E. thereof, and eastward with the railway S. of Charlottenberg.

Route xxv

From Roverud, 500 ft., on the Elverum railway N. of Kongsvinger (Appendix II, Route 89) and the road which follows it (Route xviii B), a road runs E. to (9 m.) Lundersæter. Here it forks: (A) a branch SE. runs to (19 m.) the frontier, (22 m.) Vittjärn, 650 ft., Swedish customs post, and (27 m.) Lekvattnet. The nearest railway reached by this route is at (42 m.) Torsby (Appendix II, Route 61). (B) A branch NE. from Lundersæter runs via (19 m.) Raevholt and thence generally SE. to (26 m.) the frontier, (28½ m.) Röjdåfors, 915 ft., Swedish customs post, (41 m.) Östmark, 290 ft., and (55 m.) Torsby, 204 ft., railway station (Appendix II, Route 61).

Route xxvi

From Flisen on the Kongsvinger-Elverum railway (Appendix II, Route 89) and the roads which follow it (Route xviii B) a road runs NE. and E. up the Flisa valley and thence to (19 m.) Finskogen, 607 ft., (21 m.) the frontier, (22 m.) Medskogen, Swedish customs post, (27 m.) Södra Finnskoga, 1,020 ft. Thence a road turns S. and runs roughly parallel to the frontier, via (47 m.) Nyskoga and (59 m.) Vitsand to (73 m.) Torsby, 204 ft. (see Route xxv); railway station (Appendix II, Route 61). From Södra Finnskoga another road runs E. to (36 m.) Sandbäckheden, 518 ft., on Route xxvii.

Route xxvii

From Elverum, 617 ft., junction of the Kristiania-Trondhjem and Kongsvinger-Elverum railways (Appendix II Routes 88, 89), and the roads which follow them (Route xviii), a road, on which a motor service has been worked (in summer?) runs NE. through the populous district of Nederberg to (21 m.) Tjernmøen, 1,480 ft., and (38½ m.) Nybergsund. Here it joins the road which runs NW. and SE. along the

valley of the Tryssilelv, which becomes the Klarälf in Sweden. This road, south-eastward, crosses the frontier at (56½ m.) Långflon, 985 ft., Swedish customs post, and then runs roughly parallel to the frontier. (70 m.) Norra Finnskoga, 725 ft. (84 m.) Sandbäckheden, 518 ft.: see Route xxvi (95 m.) Dalby. (113 m.) Värnäs, 460 ft.

This is the first point after the crossing of the frontier at which a main road leads to the eastward out of the valley; this road runs NE., and reaching at 125 m. an extreme elevation of 1,693 ft., descends to (141 m.) Malung, 985 ft., in the valley of the Västerdalälf, on the railway (Appendix II, Route 67) and road between Limesforsen and Mora.

The road down the Klarälf valley meets a branch from the Filipstad-Deje railway (Appendix II, Route 66) at (141 m.) Edebäck, 430 ft.

Route xxviii

From the southern end of Lake Faemundsjön a main road runs E. across the frontier. There is no direct road from westward in Norway to this point. There are routes—(a) by a road from Rena, 738 ft., on the Kristiania-Trondhjem railway, north-eastward to (19 m.) Nord Osen, 1,440 ft., at the head of Osensjön; thence across a low watershed to (34 m.) Tryssil valley (upper Klarälf) and northward along it and the Engerdal, passing Lake Engeren, 1,535 ft., to (71 m.) Drevsjö: see below. (b) By a road from Röros, 2,060 ft., on the Kristiania-Trondhjem railway, south-eastward past (10 m.) Saetern i Röros and (20½ m.) Langen to (23½ m.) Sönderviken at the northern end of Faemundsjön. This lake (alt. 2,175 ft.) is about 35 m. long, and along it the route lies by steamer to the southern end, Sydend or Faemundsend.

From Sydend the road runs E. to (5 m.) Drevsjö (see above); (10 m.) the frontier; (11½ m.) Flötningen, Swedish customs post, and (31½ m.) Idre, 1,555 ft., on the upper part of Öster Dalälf. This river is followed down to (52 m.) Särna, 1,450 ft.; then the road ascends, leaving the valley, and leads through sparsely inhabited country till at 88 m.

it descends to the river again. (91½ m.) Åsen. (103 m.) Älfdalen, 788 ft., terminus of a railway to Mora on Lake Siljan, &c. (Appendix II, Route 67).

Route xxix

From Røros, 2,060 ft., on the Kristiania-Trondhjem railway (Appendix II, Route 88) and the road which follows it (Route xviii B), a road runs generally eastward via (10½ m.) Jensvold and (21½ m.) Skotgaarden or Brekken on Aursundsvand, 2,284 ft., to (28 m.) the frontier. (34½ m.) Fjällnäs sanatorium (Malmagen), 2,580 ft. (48½ m.) Funäsdalen, Swedish customs post, 1,913 ft. From here the Ljusna valley is followed practically all the way down to Ljusdal. (86 m.) Hede. (93 m.) Vikarsjön, 1,355 ft.

Here a road branches NE. via (98½ m.) Vemdalen and (117 m.) Klövsjö, beyond which it joins and approximately follows the line of the railway under construction to (167 m.) Brunflo on the Bräcke-Storlien line near Östersund (Appendix II, Route 82).

Main road continues : (113½ m.) Linsäll, 1,315 ft. (131 m.) Sveg, 1,142 ft. ; railway from Orsa, see Appendix II, Route 68. (141 m.) Älvros, 1,109 ft. (166 m.) Kårböle, 722 ft. (203 m.) Ljusdal, 430 ft., on the main northern railway (Appendix II, Route 72, mile 235), junction of a line to the port of Hudiksvall. The road continues to this port also, and there is a road southward (but not northward) along the main line.

Route xxx

From Vaerdalen (Vaerdalsören) on the east shore of the inner part of Trondhjemsfjord, 7½ m. beyond Levanger along the railway from Trondhjem to Sunnan (Appendix II, Route 87) and the road between those places (Route 19), a road runs E. up the Vaerdal. (23 m.) Sulstuen. A short distance beyond this point, road forks.

(A) The right branch, a hilly road, reaches the frontier, 2,372 ft., at 30½ m., and (44½ m.) Skalstugan, 1,900 ft.,

Swedish customs post. Thence road continues, generally descending, through forest, to (71 m.) Dufed, 1,263 ft., on the Bräcke-Storlien railway (Appendix II, Route 82), which the road follows to Östersund, &c.

(B) The left branch leads to (32½ m.) Sandviken, 1,375 ft., crosses (35½ m.) the frontier, 1,700 ft., about 6 m. NE. of the right branch, and reaches (45½ m.) Melen, 1,378 ft., Swedish customs post. There is no through road from here, but a regular boat route along Lake Anjan and across Lake Kallsjön leads to a road along the E. shore of the latter lake, running to the railway (Appendix II, Route 82) at Hjärpen, a distance of about 56 m. in all from Melen.

Route xxxi

From Namsos, a considerable port on Namsenfjord, a road runs generally E. up the valley of Namsen river. Motor service, Namsos-Fiskum; time, 3 hrs. (9½ m.) Hun. (16½ m.) Haugum. (27 m.) Vie. (30 m.) Grong (Medjaa).

From Grong a road branches NE. to (33 m.) Fossland, 197 ft., and (39¼ m.) Fiskum, beyond which it continues up the Namsen valley to Trones, whence there is a track to the head of the valley, across a low divide to Majavand, and down the Svenningdal. From the foot of Svenningvand there is a cart-road down the valley to the main road in the Vefsna valley at Fellingfors (Route 32), by which Mosjöen on Vefsenfjord is reached. This south-to-north route reaches no greater height than 1,135 ft. at Majavand, and a railway has been projected.

From Grong, main road continues: (35½ m.) Formofos. Near this the road from Stenkjaer (Route 19 B) comes in, and road continues E. via (55½ m.) Mortenslund and (76½ m.) Storviken or Nordli, 1,486 ft., to (90½ m.) the frontier, 1,011 ft. Beyond this is (97 m.) the Swedish customs post of Gäddede, near Frostviken church. Road continues to (116 m.) Bågede and (121 m.) Torsfjärden, but there is only a rough track beyond, and the usual route in summer is by steamer from Gäddede down the chain of lakes called Strömsvattudal via

Bågede to Strömsund on the railway from Östersund (Appendix II, Route 83), a distance by water of about 70 m.

Strömsund is a centre of roads—to Krokum and Östersund south-westward; to Dorothea north-eastward, and to Ramsele (205 m. from Namsos) and thence to Långsele (242 m. from Namsos) on the Bräcke-Boden railway (Appendix II, Route 72, mile 399 $\frac{1}{4}$). There are steamers on the Faxa river from Ramsele downward, but navigation is interrupted at Nordanåker.

D.—NORTHERN NORWAY AND SWEDEN

Northward of the Namsos-Strömsund route (Route xxxi, above) there are no main roads which cross the frontier between Norway and Sweden, and the few roads in the Norwegian strip of territory are of little more than local importance, and will not be detailed here. On the Swedish side there are a number of fair roads leading up-country from the railway between Östersund, Bräcke, and Boden, but they generally terminate at the villages situated at or near the foot of the great lakes. In summer the lakes themselves provide boat communication farther on; from one lake to another there are merely footpaths, which sometimes cross marshy stretches on planks (*spångningar*). There are *skjutsstationer* and rowing-boats on the large lakes; the usual type has a high pointed bow and stern, is often very low amidships (so that no great load can be carried and the boat is not too safe in the considerable sea which sometimes gets up on these lakes), and is propelled by very short, broad-bladed oars, and also steered with one or sometimes a pair of them, the coxswain performing his share of propulsion with a forward (pushing) stroke. On a few of the lakes there are small steamers or motor launches.

Between the head of the valley-roads in Norway and the head of the great lakes in Sweden there are only mountain tracks, which are difficult and very little used in summer; but some of them, having regard to the sparse population

of the country, carry a considerable traffic by sledge and ski in winter. The chief of these routes are as follows.

Route xxxii

From Mosjöen on Vefsenfjord a road leads via (27 m.) Fellingfors (Route 31) to (50 m.) Hatfjelddalen, 728 ft. Thence bridle path S. and E. up Susnadal, just passable for wheels to (77 m.) Kroken; thence to (86 m.) Harvasstuen, 2,106 ft., on frontier. Track used as winter road to Fatmakke (about 110 m.) and Vilhelmina (about 175 m.; railway, see Appendix II, Route 83).

Another bridle path NE. from Hatfjelddalen, just passable for wheels to (61 m.) Krutaaen; thence track, used as winter road, to (71 m.) Krutaadal *fjeldstuer* or refuge-hut, Krutvattna, a small lake on frontier, 1,942 ft., and (97 m.) Tärnaby (see Route xxxiii).

Route xxxiii

From Mo near the head of Ranenfjord, a fair road leads up the right bank of the Tveraa to (15½ m.) Rödvatn, 1,601 ft., and thence, reaching an extreme elevation of 2,054 ft., to (25 m.) Umbugten, 1,742 ft. This station is close to the frontier, and at the head of the Öfver Uman Lake, which the frontier crosses. From here there is no more than a track along the banks of the lakes and intervening stretches of river past (75 m.) Tärnaby and (105 m.) Umnäs to (152 m.) Stensele at the foot of Stor Uman Lake. The valley is sparsely inhabited, like all these upland valleys in Sweden, and summer traffic is carried on by rowing-boat on the lakes. There is (or used to be) a small steamer on Stor Uman. From Stensele there is a road, rough in parts, down the valley to Lycksele (213 m. from Mo; the junction of roads to the neighbouring valleys of the Ångerman and Vindel to the west and east respectively) and 10 m. beyond this point the road forks, one branch continuing down the Ume to Tvärålund on the Bräcke-Boden railway (258 m.) and the

other keeping farther to the NE., and reaching Hällnäs station on the same railway (244 m. from Mo). For the railway see Appendix II, Route 72, miles 541 $\frac{1}{2}$ and 557 $\frac{1}{2}$.

Route xxxiv

From Ytteren near Mo there is a road up the Dunderlandsdal, together with a light railway as far as (12 $\frac{1}{2}$ m.) the Dunderland iron mines, to (15 m.) Naevernes and (34 m.) Bjellaanes. Winter routes from Naevernes and Bjellaanes eastward into Sweden. Track northward to Russaanes in the valley of the Saltelv. Along this valley there is a road from Rognan (Saltdalen) at the head of Skjaerstadfjord, which is the inland continuation of Saltfjord, at the mouth of which is the port of Bodö. Up the valley (Junkerdal, or Graddis in its upper part) a bridle-path, much frequented in winter, crosses the frontier to the head of the Skellefte valley in Sweden. There are many Lapps in this district, and along the track are a number of refuge-huts (Norway *fjeldstuer*; Sweden *fjällstugar*), such as are provided on several of these northern winter routes. The track leads to the station of Jäckvik on the lake of Hornafvan, and on this lake, and the lower lakes of Uddjaur and Storafvan, there are steamers. From Arjepluog at the foot of Hornafvan, and from Afvaviken at the foot of Storafvan, there are roads which unite at Arvidsjaur, from which there is a good road to Jörn on the Bräcke-Boden railway (Appendix II, Route 72, mile 620 $\frac{1}{2}$). The distance from Arvidsjaur to Jörn is 33 m., and the total distance from the Junkerdal to Jörn about 220 m.

Route xxxv

On Skjaerstadfjord (above) is Finéidet, the port for the Sulitelma copper mines. Above it is a lake (Nedre Vand), on which there are small steamers, and at the head of this lake is Furulund, the head-quarters of the Sulitelma mines. Railway. There is a rough track, reckoned as three days' walk, with a number of rivers and streams to ford, and in summer not feasible before July owing to snow, from Furulund

through the Lairodal and by the Varvek hut to the Tarra hut and Njunjes to Kvikkjokk on the lake of Saggatjaur (Lilla Lule river). From here on the chain of lakes down to Junkarhällan there are motor boats or steamers; there is also a track along the valley. From Junkarhällan there is a good road to Jockmock, the principal village in the district, and Vuollerim, where roads branch (a) to Murjek on the Narvik-Boden line, Appendix II, Route 85, and (b) to Boden down the Lule valley. From Kvikkjokk to Junkarhällan is about 68 m.; Junkarhällan to Jockmock, 8 m.; Jockmock to Vuollerim, 28 m. (Vuollerim to Murjek, 12 m.); Vuollerim to Boden, about 60 m. Total distance from Kvikkjokk to Boden, about 164 m. There are small steamers on the Lule between Hednoret (a station on the Bräcke railway close to Boden, see Appendix II, Route 72, mile 702 $\frac{1}{2}$) and Storbacken (near Vuollerim), but navigation is interrupted by the great rapids of Edefors.

All the above routes are south of the Narvik-Gällivara railway, which crosses the frontier at Riksgränsen.

E.—NORTHERN LAPLAND

The Lapland routes are mainly winter tracks for reindeer sledges. Many are difficult to traverse in summer on account of marshes. In summer travel is on horseback or by boats along the river. Reindeer are not used for riding. They can be used as beasts of burden but can only carry light loads and when laden must rest frequently. About 60 lb. is the load for a reindeer in summer, but 200 lb. or more can be drawn by a single reindeer harnessed to a sledge in winter when the surface is good.

Lapp guides are necessary on most routes, since it is frequently difficult to find the route. On high ground above the tree line sledges can go in any direction in deep snow.

March is the best season for travel since the snow is still in good condition and the lakes frozen, while the days are beginning to lengthen. Four reindeer and three sledges are usually required for a journey, one for the traveller, one for

the guide, and one for the baggage ; one reindeer is held in reserve. Boats for summer travelling are flat-bottomed and narrow. Each carries one or two travellers in addition to the crew. Oars are used in deep, and punt-poles in shallow, water. Mosquitoes are a great nuisance in summer.

Route xxxvi

From Skibotten on Lygenfjord a fairly good track leads into Finland. Skibotten has good anchorage which rarely if ever freezes in winter. The route ascends Skibottendal on the north side of the river keeping well above the foot of the valley which is marshy in summer. The valley is wooded about as far as the frontier of Finland ; it narrows 10 m. above its mouth. (16 m.) Helligskoken fjeldstue. Road then becomes steeper but nowhere has a gradient of more than 1 in 8 ; average width of road $6\frac{1}{2}$ ft. (25 m.) Finnish frontier. A track continues on Swedish side of Swedo-Finnish frontier. (52 m.) Karesuando, where road from Alten joins, Route xxxvii. (87 m.) Palojoensuu, whence fairly good road to (284 m.) Torneå or to Rovaniemi 262 m. (see *Handbook of Finland*). The journey from Karasuando to Torneå may be made by boat, about 300 m.

Route xxxvii

From Bossekop, a small port and Lapp settlement at the head of Altenfjord, a well marked track leads to Kautokeino and across the Enontekiö region of Finland to Karasuando in Sweden. Leaving Bossekop the road is about 12 ft. wide. It goes E. to (4 m.) Alten on Altenfjord, crossing the Elvebakken by an iron bridge $8\frac{1}{2}$ ft. wide. It then leads through woods up the valley of the Altenelv to (10 m.) Vina and rises rapidly over the flat Baeskadas mountains past (20 m.) Gargia. This part of the road is difficult and an elevation of about 1,750 ft. is reached on barren ground ; five lakes and the River Macijok (Matse) are crossed. At (86 m.) Mieronjarre the track descends steeply to the River Kautokeino which it follows to (100 m.) Kautokeino, 867 ft., a tele-

graph and telephone station. The old route used to ascend the Eibyelv valley from Alten and keep farther west till it joined the above route at the River Macijok. It was frequently blocked by heavy snowdrifts and for this reason was abandoned.

From Kautokeino a track branches to the left (see below). The main road is marked and good to (127 m.) Aiddejarre on the Norwegian frontier. Thence across the Enontekiö district of Finland it is fair. At (160 m.) it crosses the Swedish frontier at Karasuando, 1,037 ft., telegraph; crosses Skibotten-Torneå road (Route xxxvi). Thence a fair track over hilly country to (300 m.). Kiruna on the Lapland Railway (Route 85). The stage from Karasuando to Kiruna is generally taken by horses and not reindeer.

The track which leaves the main road to the left at Kautokeino leads through Enontekis (Helta) in Finland to (65 m.) Muonioniska (Muonio) on the River Muonio, whence a good road follows the Rivers Muonio and Torneå to Torneå (see *Handbook of Finland*). This is a good winter route and is considered to be the most direct way from Alten to the Gulf of Bothnia.

Route xxxviii

From Alten a track ascends the steep Tverelv valley and branches. The main branch to the right goes over high undulating ground to (32 m.) Bjebeske, 1,399 ft. Here the road ends and a path continues across Lake Jesjarve, 1,590 ft., and descends to Mollesjok. It then rises again before descending gradually to (82 m.) Karasjok, 440 ft., the chief town in the interior of Lapland; telegraph and telephone connexions.

From Karasjok a little used and unmarked track turns SE. to Kautokeino, a distance of 80 m. The only fjeldstue is at Sjuosjarre at the head of the River Jesjoki which the track follows from Karasjok. It joins the Alten-Kautokeino track (Route xxxvii) at Mieronjarre.

The branch from this track which leaves it near Alten goes

to (45 m.) Skoganvarre where it meets the Laxelven-Karasjok track (Route xxxix). It rises over high flat country and crosses two rivers. Telegraph wires mark its course.

Route xxxix

From Porsangerfjord a route leads south to Karasjok. It is marked by telephone wires and is fairly good. It is now the winter mail route. Most of it is a lowland track. From Kistrand on the west side of Porsangerfjord boat can be taken to Kolvik where the route begins. At (20 m.) Laxelv the route leaves the fjord; it is 12 ft. wide here. At (30 m.) Skoganvarre branches lead west to Alten (Route xxxviii) and south-east to the River Tana (Route xl). 90 m. Karasjok (see Route xxxviii).

Route xl

The summer route to Karasjok is from Tana on Varangerfjord. It is mainly by boat along the Tanaelv on which navigation is not difficult (see p. 33), but there is also a track along the Norwegian bank of the river. Track ascends left bank of Tanaelv to (18 m.) Seida, and (25 m.) Skippigorre where a good carriage road leads east to Vadsö (Route xlii). After 35 m. Polmak the right bank is Finnish territory. The only settlement of any size on the Finnish side is Utsjoki, whence a route leads S. into Finland. On the Norwegian side there are a few small villages. At 143 m. the track turns west up the River Karasjoki to (150 m.) Karasjok (see Route xxxviii).

Boats can continue the ascent of the Tanaelv and its tributaries the Anarjokka and Skjetsamjokka on the Norwegian-Finnish frontier. There they must be carried a few hundred yards to Lake Hielmajärvi whence they can pass to the River Ounasjoki, River Kemi, and the Gulf of Bothnia. The total distance from Tana to the Gulf of Bothnia is about 500 miles.

Route xli

A winter route goes from Karasjok east into Finland. It follows the Karasjoki to (7 m.) its confluence with the Tanaelv and the Anarjokka (Marijoki). There it turns S. along the left bank of the Anarjokka as far as (45 m.) Vuopionsu on the Finnish side. It then turns E. along the Vaskajoki, passes the south end of Muddusjärvi and reaches (80 m.) Inari on Lake Inari. From Inari there are winter routes to Neiden on Bügofjord (100 m.), to Utsjoki on the Tanaelv (85 m.), to Kyrö and Pechenga, and south to Köngäs and Sodankylä for Rovaniemi and Kemi. For these and other routes from Varangerfjord into Finland, see *Handbook of Finland*.

Route xlii

There are several fair roads on the shores of Varangerfjord. The chief one leaves the Tana-Karasjok road (Route xl) at Skippigorre and runs E. As far as Vadsö (40 m.), it has a general width of 12 ft., and where it is narrower passing-places are provided. Beyond Vadsö the road continues near the sea to (90 m.) Vardö: this part varies in width from 8 to 17 ft., and the surface is indifferent.

Route xliii

From Neiden on Bügofjord a good road goes by Langfjord, and Svanvik on the Pasvikelv into Russian territory, ending at Pechenga (50 m.). There is a branch to Boris Gleb. From Pechenga a good road, excellent in winter, has been built to Kyrö in Finland. For this road and connexions see *Handbook of Finland*.

CHAPTER XIII

WATERWAYS, RAILWAYS, AND TELEGRAPHS

Coasting steamers—Rivers and lakes of Norway—Canals of Norway—Rivers and lakes of Sweden—Canals of Sweden—Railways—Telegraphs, cables, and wireless stations.

COASTING STEAMERS

THE coasting traffic in Norway and Sweden is most important. In Norway in particular coasting services afford the only means of communication to many places. The services are frequent and the main-line boats are large and well equipped. Express services call at the chief ports where they connect with small local steamers. There is also a frequent service of cargo boats. Steamers run daily from Kristiania to Stavanger, Bergen, and Trondhjem, and daily from Bergen to Trondhjem, Bodö, Tromsö, Hammerfest, and Vardö. Express boats take about $2\frac{1}{2}$ days from Kristiania to Bergen, and about 7 days from Bergen to Kirkenes. Ports in Kristianiafjord have frequently more than one steamer daily. There are frequent services to Göteborg, and from Tromsö and Hammerfest to the Murman Coast and Arkhangel. This last service is the only one which is suspended in winter.

Swedish coasting traffic is less important on account of the excellent railway system. Many coasting services including all in the Gulf of Bothnia are suspended in winter. In summer passenger and cargo boats serve all ports at frequent intervals. On the Göta canal there is a daily service of passenger boats between Göteborg and Stockholm.

RIVERS AND LAKES OF NORWAY

Few of the rivers of Norway are navigable on account of the high gradients and the many rapids and waterfalls. Even the lowest reaches seldom afford routes for sea-going vessels.

The Skienelv, which is navigable for 7 miles to Skien for vessels drawing up to 23 ft., is the largest river route for sea-going vessels in Norway. The Glommen is navigable for 6 miles up to Sandesund, and in 1911 a steamer of 1,684 tons reached Sarpsborg, $1\frac{1}{2}$ miles farther up. On the other hand the fjords give numerous routes, for practically all are navigable by large vessels. Most of the commerce and communication in Norway is carried on by these channels, generally by small steamers built for the purpose which ply locally in one or other fjord, and connect at certain points with larger steamers serving long stretches of the coast and having their terminus in one or other big port. The difficulties of making the rivers navigable are so great that little has been attempted in this way beyond building a few locks on short rivers between long navigable lakes. It would be impracticable to link adjacent valleys by canals owing to the general high altitude of the country. Lake navigation is of some importance and several railways bring long lakes into connexion with seaports. While the waterways serve for trade with the scattered population in the valleys their principal use is for tourist traffic in summer, and most of the lake steamers have been constructed with this end in view. Many of the rivers are navigable locally by boats, and all the large streams are used for floating timber (see p. 150).

The chief lakes on which there are steamers are the following, with their connecting railway, river, and canal routes :

Aardalsfjord (in Saeterdal) : see Railway Route 100, and Byglandsfjord waterway.

Aremarksjön : see Fredrikshald canal.

Bandaksvand : see Bandak or Telemarken canal.

Flaavand : see Bandak or Telemarken canal.

Hitterdalsvand : see Skien canal and Railway Route 94.

Hornindalsvand (Nordfjord).

Hvidesjön (Kviteseivand) : see Bandak or Telemarken canal.

Kröderen : see Railway Routes 92 and 95.

Langvand and Öfrevand in Nordland linked by narrow-gauge Sulitjälma railway, 4 miles long.

Mjösen with navigation up the Laagen to Lillehammer and down the Vormen to Eidsvold. See Railway Routes 88, 90, and 93.

Nisservand : see Vraa canal and Railway Route 98.

Nordsjön : see Skien and Bandak canals and Railway Route 94.

Ödemarksjön : see Fredrikshald canal.

Öieren : see Railway Routes 65 and 88.

Öresjön : see Fredrikshald canal and Railway Route 91.

Randsfjord : see Railway Routes 92 and 93.

Selbusjön (Trondhjem).

Siljordsvand.

Snaasenvand : see Railway Route 87.

Spirillen with navigation down the Baegna or Aadalsälf to Hen : see Railway Routes 92 and 95.

Stora Le : see Fredrikshald canal and Railway Route 64.

Tinsjön : see Railway Route 94.

Tyrfjord : see Railway Routes 92, 94, and 95.

Vraavand : see Vraa canal.

Among less important lakes the following have motor boats or steam launches for tourist traffic : Bydinsjön, Gjende, Loenvand, Oldenvand, Strynsvand, Sundalsvand, and Tyinsjön.

CANALS AND CANALIZED RIVERS OF NORWAY

The **Bandak** or **Telemarken** canal was constructed in 1889-92 to connect Nordsjön with the Bandak lakes, and before the construction of the Kristiania-Bergen railway was an important link on the easiest overland route between Kristiania and Bergen. The canal begins at Ulefos on Nordsjön. For navigation to Ulefos from Skien see Skien canal and Railway Route 94. At Ulefos three locks raise vessels a total of 36 ft.; at the second of these three locks the river Eidelv is crossed by an arched timber bridge. The route follows the Eidelv to the two Holene locks (2 miles from Ulefos), lift 32 ft., and the six Vrangfos locks (3 miles), lift 75 ft. At the top of the

Vrangfos locks is a granite dam, 105 ft. high and 69 ft. thick to raise the level of the river. The next locks are at Grotevje (7½ miles from Ulefos), 1 lock, lift 10 ft.; Kjeldal (9 miles), 1 lock, lift 10 ft.; and Hogga (10½ miles), 2 locks, lift 23 ft. Then navigable river of 3 miles to Strengen on Flaavand, alt. 236 ft., the easternmost of the Bandak lakes. There is navigation through Flaavand (9 miles long) and Hvidesjön (6 miles long), and thence the artificial channel of Skåperudstrømmen (3½ miles long), and Bandaksvand (16 miles long) to Dalen. From Skien to Dalen, a total distance of about 69 miles, the steamer takes about 8 hours, including stops and delays in the locks. The passage of the 6 locks at Vrangfos takes 25 minutes.

The dimensions of the locks are 123½ ft. long and 22 ft. wide. The depth of the water in the locks is 8½ ft. Most of the locks have been cut out of solid granite.

From Dalen there is a good but mountainous road to Odda or Sörfjord (see Chap. XII, Route vi).

In Saetersdal there is steamer navigation on **Byglandsfjord**, the southern and northern parts of which, called respectively Aardalsfjord and Aaraksfjord, are connected by a lock. There is railway connexion from the south end of Byglandsfjord to Kristiansand (see Route 100).

The **Fredrikshald** canal, completed in 1877, allows vessels of 5 ft. 6 in. draught to pass from the Norwegian seaport of Fredrikshald to the long lakes to the north-east. Most of the route is by lake : the canal stretches are short. The most northerly point that can be reached by this route is Skullerud (railway) at the north end of Öresjön. The approximate distance from Fredrikshald to Skullerud by canal, river, and lake is 50 miles. This route is used mainly for floating timber and a few tourist steamers. The Öresjön navigation is linked by a short, little-used canal, with that of the Swedish lakes to the east, the Dalsland canal, and Lake Vänern. The route is as follows :

miles

- 0 **Fredrikshald** : seaport, railway. Vessels ascend Tistedalselv.
- 3 **Femsjön**. Railway at Tistadalen (Route 64).
- 5½ Vessels enter Stenselv. Broekke lock.
- 7½ Krappeto lock.
- 9½ **Aspernsjön**, which vessels cross.
- 14 Vessels turn N. up Skotsbergelv.
- 17 **Aremarksjön**, which vessels cross.
- 22 **Stromsfos** locks. Vessels ascend Strömselv.
- 27 **Ödemarksjön**, which vessels cross.
- 30 Vessels turn E. Route to Skullerud continues via Örjeelv and lock (37½ miles) and Öresjön to Skullerud, 50 miles.
- 32½ **Ottej** timber canal (¾ mile), little used. Route turns SE.
- 33 **Stora Le** lake. Railway at Ed at S. end (Appendix II, Route 64).
- 38 Swedish frontier. Vessels turn NW.
- 42½ Vessels turn SE. down Stora Le. For routes to N. see Dalsland canal.
- 45½ **Lennartsfors**. Short canal to Lelången lake.
- 68½ **Bengtsfors** (Appendix II, Route 63). Short canal the first part of the **Dalsland** canal.
Route passes by lakes and short canals alongside railway.
- 71½ **Billingsfors** (Appendix II, Route 63), then across Laxsjön to
- 75 Short canal. Follows small lakes and canal, ¾ mile to
- 76 **Långed**. Down Råvarpen Sound and across Råvarpen.
- 81½ **Arklången** lake, which vessels cross.
- 84½ **Häfverud** canal (¼ mile). Canal carried over water-fall by iron viaduct 105 ft. long and 15 ft. wide. Route through lakes to
- 90½ **Köpmanebro** on Lake Vänern : railway (Appendix II, Route 61).

The **Skien** canal is a short canalized channel of the Skienelv. The Skienelv is navigable from the sea by vessels not drawing over 23 ft., and the channel has been widened to a minimum of 33 ft., but above Porsgrund the speed of the current necessitates the use of steam or warp. In the town of Skien a fall in the river is overcome by two locks. Above Skien the river is called the Hjellevand. After $2\frac{1}{2}$ miles a vessel enters Meyerälf channel to the right of several islands and reaches the four Löveid locks, thence passes by a narrow channel cut in the rock to Nordsjön. For communication to Hitterdalsvand and beyond see Appendix II, Route 94, and Chap. XII, Route iii. The length of the locks is $123\frac{1}{2}$ ft., the width 22 ft., and the depth of water in the locks is $8\frac{1}{4}$ ft. The canal is constructed for vessels drawing not over 8 ft.

The **Vraa** canal connects the lakes of Vraavand and Nisservand lying south of Bandaksvand. The difference in level of the two lakes is about 9 ft. and the distance 2 miles. This stream has been partly canalized and one lock 87 ft. long constructed. The depth of water at the entrance of the lock is 5 ft. $3\frac{1}{2}$ in., but it often falls to 4 ft. $7\frac{1}{2}$ ins. The lock is old and in bad repair (1900), but is still in use. At the south end of Nisservand there is a railway from Tveitsund to Arendal and Grimstad (see Appendix II, Route 98).

RIVERS AND LAKES OF SWEDEN

The length of waterways in Sweden suitable for small boats is considerable, and in the early days of Sweden the rivers were practically the only highways except when snow made sledge traffic possible. In the less developed northern part of the country the rivers are still the chief lines of communication. Few rivers in Sweden, however, are fit for navigation by large vessels. They are too full of rapids or too empty of water. Practically no rivers except the lower part of the Götaälf and the Dalälf from Insjön to Leksand form natural waterways for steamers, but the lowest few miles of several rivers are by nature deep enough or have been dredged

to a sufficient depth to afford access to seaports a few miles above their mouths. Lakes, on the other hand, afford valuable deep waterways. The great lakes Vänern, Vättern, and Mälaren are navigated in all directions by steamers. Few of the lakes in the more populated parts of the centre and south of the country are without steamers. Many of the northern lakes also have steamers, including Runnsjön, Siljan, Orsasjön, Storsjön in Jämtland, the Strömsvattudal lakes (which are the upper course of the Faxälf and include Nedrosjön, Öfresjön or Fägelsjön, and Hetögel'n), Storafvan, Uddjaure, and Hornafvan; but this list is not exhaustive.

Short canals or canalized natural channels link some of the lakes together and form long inland routes. The most important canals are the Trollhättan canal linking Vänern to the Götaälf and the Göta canal linking Vänern to Vättern and Vättern to the Baltic. Practically all the canals are in central Sweden. Most of the canals and other waterways have been eclipsed to some extent by railways, but there are signs that they are again attracting more attention, and several schemes of improvement are under consideration or actually in progress. The improved Trollhättan canal is now open to ocean-going vessels. All the canals and waterways are under state control.

The passenger steamers on the Swedish inland waterways, as well as the many coasting steamers, are remarkably capacious and well appointed despite their necessarily small size.

CANALS AND CANALIZED RIVERS OF SWEDEN

The chief canals and waterways are as follows:

The Åker canal, finished in 1886, links Trälhafvet, an arm of the sea, to the north-east of Stockholm, to Garnsviken. The total length of the waterway is $6\frac{1}{2}$ miles, of which a little over 2 are artificial. The depth of the canal is $6\frac{3}{4}$ ft., and its bottom width is $29\frac{1}{2}$ ft. The one lock is 90 ft. long, $24\frac{1}{4}$ ft. wide, and $6\frac{3}{4}$ ft. deep. The chief use of this canal is for traffic to and from the state powder factory at Åker. A light railway

from Stockholm to Österskär crosses it near its mouth, see Railway Route 70.

The **Dalsland** canal, completed in 1869, links Lake Vänern with Lake Lelängen, Sillen, and Stora Le lying on the Norwegian frontier. The newly completed Stora Le or Töcksfors canal links Stora Le with Östen to the north, and the short Snäcke canal leads to Lake Änimen to the east. The canalized portions of the Dalsland waterway are at Häfverud, where the canal crosses a stream by a viaduct 105 ft. long and 15 ft. wide and enters Lake Arklången, at Långed, Langbron and between Billingsfors and Bengtsfors. At Krokfors between Västra Sillen and Östra Sillen a short canal, called the **Silarna** canal, carries vessels across a narrow isthmus. The artificial cuts of the **Stora Le** canal are at the north and south ends of Lake Töcken. The length of artificial waterways in these systems is $6\frac{1}{2}$ miles. There are 31 locks, each $68\frac{1}{2}$ ft. long (73 ft. in the Stora Le canal), $13\frac{3}{4}$ ft. wide, and 6 ft. deep. The total length of the navigable waterways in the Dalsland system is about 185 miles and extends as far north as Östervallskog on Lake Östen, north of Stora Le, Silbodol, at the north end of Västra Sillen, Sillerud at the north end of Östra Sillen, and Sil at its north-east end. To the west the Dalsland waterways lead via Stora Le into Norway (see Fredrikshald canal). To the east the **Snäcke** canal (100 yds., 1 lock, same dimensions) leads to Änimskog. Railways meet the Dalsland waterways as follows: at Köpmannebro, the entrance on Lake Vänern, the main line from Göteborg to Falun and the north crosses (Appendix II, Route 61); at Bengtsfors and Billingsfors a light railway from Uddevalla (Route 63), and at Ed, a branch from the main line from Kristiania to Göteborg (Route 64). This line also passes Änimskog on Lake Änimen (Route 61).

The **Enköpingå** has been canalized since 1836 from Enköping to Svingarnsviken, a gulf of Lake Mälaren. The channel is $2\frac{1}{4}$ miles long and is fit only for small vessels. Its depth is $7\frac{3}{4}$ ft. and its bottom width is $9\frac{3}{4}$ ft. There are no locks.

The **Eskilstunaå** is navigable from Lake Mälaren to Thorshälla falls and from above Thorshälla falls to Eskilstuna. In 1860

a short canal about one mile long was completed which avoids the falls and allows small steamers to pass direct to Eskilstuna from Lake Mälaren and Stockholm. The canal has 2 locks, each 117½ ft. long, 23 ft. wide, and 8 ft. deep.

The **Filipstad-Sjöandan** canal is the name given to the waterway between Filipstad and Lake Bergsjön on the railway 6 miles north-east of Kristinehamn on Lake Vänern (Appendix II, Route 67). It is 25 miles long and includes Lakes Daglösen, Stora Lungen, and Ojevättern. Only 2¾ miles are artificial. They have a minimum depth of 4½ ft. and a bottom width of 12 ft. There are 5 locks about which no details are available.

The three long **Fryken** lakes in Värmland are connected by narrow channels that have been slightly canalized in places. The total length of this waterway is 47 miles, and is navigated by small steamers the draught of which cannot exceed 4¾ ft. on account of the shallow connecting channels. There are no locks.

The **Hjälmare** canal was the earliest canal in Sweden, but was reconstructed in 1830. It runs from Lake Hjälmaren, north to the navigable Arbogaå which flows into Lake Mälaren. Small steamers can thus pass from Stockholm to Lake Hjälmaren. The canal is 10 miles long including lakes: half of this length is artificial. There are 9 locks, each of which is 105 ft. long, 23 ft. wide, and 6½ ft. deep. The depth of the canal is 6½ ft. and its bottom width 33½ ft. Between the northern end of the canal and Kungsör on Lake Galten are 7 miles of the Arbogaå, with no locks. Lakes Galten and Mälaren are connected by the strait of Kviksund which the railway crosses (Appendix II, Route 35). A branch of this line also crosses the Arbogaå at Kungsör.

The **Hörken** canal is the canalized river between Lakes Norra and Södra Hörken in Västmanland. The waterway is 11 miles long of which ½ mile is artificial. The minimum depth is 4 ft., and the bottom width is 13½ ft. There is one lock. The waterway is crossed by the railways from Frövi to Ludvika (Appendix II, Route 39) and from Kil to Falun (Route 61).

The **Göta** canal is the longest canal in Sweden. Its length

from Lake Vänern to the Baltic is 117 miles, of which $53\frac{1}{2}$ are artificial. It was completed in 1832 and has not yet been rebuilt, but the improvements recently completed in the Trollhättan canal (see p. 254) have emphasized the necessity of widening and deepening the Göta canal. The depth of the canal is $9\frac{3}{4}$ ft. and its bottom width $39\frac{1}{4}$ ft. There are 58 locks, each 105 ft. long, 23 ft. wide, and 9 ft. deep. Over 20 road and railway swing bridges cross the canal. At Lake Viken the waterway attains its greatest height of 300 ft. above sea-level. Steamers, both passenger and cargo, up to the dimensions of the locks, navigate the waterway, but as the passage of the lakes is long and sometimes stormy the vessels must be seaworthy. The speed of vessels in the canal is limited to 4 to 5 knots.

The Trollhättan and Göta canals afford a waterway across southern Sweden via the great lakes. The total distance from Göteborg to the Baltic is 242 miles, and the time of journey about $2\frac{1}{2}$ days. From the Baltic to Stockholm there is a short cut via the Södertälje canal (p. 253).

CANAL ROUTE FROM GÖTEBORG TO THE BALTIC

This itinerary follows the old Trollhättan canal, from which the new canal deviates little.

miles	
0	Göteborg. Route lies N. up the Götaälf under railway swing bridge (184 ft. long) on line to Strömstad. Main line to N. ascends by l. bank of river as far as
22	Alfhem.
32	Lilla Edet. Two locks of the Ströms canal. Railway from Alfhem, 9 miles (Appendix II, Route 61).
42 $\frac{1}{2}$	Åkerström. Lock.
43 $\frac{3}{4}$	Åkervass. Trollhätte canal, past Trollhätte falls and power station, begins on r.
	Eleven locks, built in 1836-44, distributed over 1,000 yds. with a total lift of 110 ft. Immediately to the north and alongside are the old locks, built

miles

- in 1800 and still used for smaller vessels. The reconstructed canal (see below) will leave the Götaälf S. of the present entrance and ascend by a new set of locks.
- 44½ **Åkersjön**, which vessels cross to
- 44½ **Bergs** canal, a lockless stretch of the Trollhättan canal. Mills and factories on l.
- 46 Vessels re-enter the Götaälf and pass railway bridge (Route 61).
- 50½ **Karlsgraf** canal on l. by which vessels avoid Rånnum falls ; 2 locks.
- 52¾ **Vassbotten**, which vessels cross to
- 53¾ **Vänern**, alt. 145 ft., railway, on Lake Vänern, which vessels cross.
- 125 **Sjötorp**. **West Göta** canal begins. 8 locks before Lyrestad.
- 129½ **Lyrestad** : light railway Göteborg and Lidköping to Gårdsjö crosses (Appendix II, Route 59).
- 130½ **Nordqvarn**, after 2 locks. 9 locks more before
- 133½ **Hajstorp**.
- 136½ **Töreboda**. Göteborg-Stockholm line crosses (Appendix II, Route 58).
- 146 **Viken** lake, alt. 300 ft., after 1 lock. Vessels pass along lake to
- 158½ Narrow channel across a peninsula to
- 159½ **Forsvik**, 1 lock, leading to Bottensjön which vessels cross.
- 164½ Narrow strait to **Karlsberg** on Lake Vättern, alt. 289 ft. ; railway from Sköfde (Appendix II, Route 58). Vessels cross Vättern and enter **East Göta** canal at
- 184½ **Motala**, on Varviken ; engineering works ; 1 lock. Main railway Malmö to N. crosses (Appendix II, Route 37).
- 187½ **Borensnult**, 5 locks. Vessels descend to Lake Boren, alt. 240 ft., which they cross to

miles	
194 $\frac{3}{4}$	Borensberg , 1 lock ; light railway from Linköping and Klockrike (Appendix II, Route 36).
208 $\frac{3}{4}$	Berg , 15 locks in 4 pairs and then 7 ; light railway at Vretakloster, $\frac{1}{2}$ mile to S. ; descent to Lake Roxen, alt. 108 ft. Vessels cross Roxen to
224 $\frac{3}{4}$	Norsholm ; important railway connexions ; on main line (Appendix II, Route 1). Canal begins again.
227	Brottom , lock.
228 $\frac{3}{4}$	Hulta , lock. Vessels cross Asplångensjön, alt. 89 ft., and
231 $\frac{3}{4}$	Enter canal.
233	Klammen , lock. Canal at high level before
235 $\frac{1}{2}$	Karlsberg , 9 locks, spread over 1 $\frac{1}{2}$ miles.
238	Söderköping , one lock ; light railway Valdemarsvik to Norrköping crosses (Appendix II, Route 32).
242	Mem , last lock. Vessels enter Slätbacken, a long arm of the Baltic. For route to Stockholm by Södertälje canal, see p. 253.

The **Karlstad** to **Forshaga** waterway is the Klarälf, which has been dredged in places. There are 2 locks each 3 $\frac{1}{4}$ ft. deep and with a bottom width of 25 ft. The distance is 23 miles, of which 1 $\frac{1}{2}$ miles are artificial.

The **Kinda** canal, completed in 1871, connects Lake Roxen and the Göta canal with Lake Åsunden. The total length of the waterway is 50 miles, of which 17 are artificial, and the rest is lakes and the Stångå. The minimum depth is 5 ft., and the bottom width 17 ft. There are 15 locks, each 84 ft. long, 16 ft. wide, and 5 ft. deep. Small steamers run from Linköping (railway) to Horn on Åsunden. The line from Oskarshamn to Linköping crosses the waterway twice (Appendix II, Routes 28 and 30).

Köping is connected with Lake Galten, which is linked to Lake Mälaren by the canalized **Köpingså**, 2 miles long with a depth of 9 $\frac{3}{4}$ ft., a bottom width of 38 $\frac{3}{4}$ ft., and no locks.

The **Örebro** canal is a short stretch of the Svartå which

connects the town of Örebro with Lake Hjälmaren. Its length is about 2 miles. The minimum depth is $6\frac{1}{2}$ ft. and the bottom width 28 ft. The one lock is 105 ft. long, 23 ft. wide, and $6\frac{1}{2}$ ft. deep. For navigation from Lake Hjälmaren to Lake Mälaren, see Hjälmaren canal. Örebro is on the main line from Malmö to the north (Appendix II, Route 37).

The **Säffle** canal, which was reconstructed in 1866-9, together with the Byälf connects Glafsford in Värmland with Lake Vänern. It provides a waterway about 56 miles long, of which only 8 miles are artificial, the rest being lakes on the Byälf. The minimum depth is $6\frac{1}{2}$ ft. and the bottom width $23\frac{1}{2}$ ft. There is only 1 lock with a length of 105 ft., a width of $23\frac{1}{2}$ ft., and a depth of 10 ft. The main railway line from Göteborg to the north crosses the canal at Säffle (Appendix II, Route 61), and a railway line passes Arvika at the north end of Glafsford (Appendix II, Route 65).

The **Södertälje** canal, opened in 1819, links Lake Mälaren with Hallsford, an arm of the Baltic, and is part of the route of canal steamers between Göteborg and Stockholm. It is 3 miles long, of which a little over 1 mile is artificial. The depth is $11\frac{1}{2}$ ft., and the bottom width 39 ft. There is one lock at the north end, $126\frac{1}{2}$ ft. long, 28 ft. wide, and $11\frac{1}{2}$ ft. deep. Improvements are now in progress to deepen the whole canal to 18 ft. and to enlarge the lock. The main line from Malmö to Stockholm crosses the Södertälje canal at Saltskog and sends a branch to Södertälje (Appendix II, Route 1). The railway bridge is $50\frac{3}{4}$ ft. above the water-level.

South of Staden, the island on which Stockholm was originally founded, is the entrance to Lake Mälaren. **Stockholm** lock, which lies in the narrow channel called Södraström, is 148 ft. long, 31 ft. wide, and 13 ft. deep. The lock can be lengthened by the use of a pontoon in front of the lock-chamber to 189 ft., or by two pontoons, one at each end, to 229 ft. The northern passage (Norström) between Lake Mälaren and the Baltic is blocked by embankments carrying roads and railways.

The **Strömsholm** canal, including river and lake stretches,

affords a waterway from Lake Mälaren northward to the mining districts of Västmanland and Dalarna, 62 miles long, of which 9 are artificial. There are 31 locks, and the length of each is $65\frac{3}{4}$ ft., width 17 ft., and depth $4\frac{3}{4}$ ft. The canal depth is $4\frac{3}{4}$ ft. and its minimum bottom width 17 ft. The total rise is 328 ft. The southern end of the canal is at Strömsholm, where a channel a mile long leads into the Kolbäckså. The route follows the Kolbäckså with occasional short canals and through a few small lakes and Lakes Åmäningen, Aspen, and Barken to Smedjebacken. The last locks are at Sembla at the southern end of Södra Barkensjön. A railway line runs near one side or other of the canal the whole way (Appendix II, Routes 35 and 40).

Tisken-Runn lock connects Lake Tisken on which Falun stands with the large Lake Runn and the Dalälff. No dimensions are available.

The **Tisnare** canal is the name given to the canalized waterway from near Andebol halt, near Simonstorp, on Railway Route 1 through Lakes Fjälleren, Starrsjön, Visk, Brosjön, and Tisnaren. There are no locks. Small steamers go as far as the north-west end of Tisnaren, where from Byle there is a good road to Vingåker station on the Göteborg-Stockholm line. This is chiefly a tourist route.

The **Trollhättan** canal was first opened in 1800, was rebuilt and enlarged from 1836 to 1844, and has now undergone a second reconstruction. In its new form it was reopened to traffic in October 1916. The Trollhättan canal links Göteborg with Lake Vänern, a distance of 54 miles, of which only 5 are entirely artificial; the greater part of the route being along the Götaälf, which is canalized in places. The Trollhättan canal has 6 locks, which now have the following dimensions: 295 ft. long, 45 ft. wide, and 18 ft. deep. Sea-going vessels of 16 ft. 5 in. draught, 41 ft. in breadth, and 285 ft. long can reach Lake Vänern. All the locks are cut in rock and lined with concrete: they are worked by electric power. A special type of vessel is now being built for this traffic. Two, of 915 tons each, have been constructed at the shipyards at Uddeholm

and Karlstad. They have a length of $180\frac{1}{2}$ ft., a breadth of 29 ft., and a draught of $11\frac{3}{4}$ ft., and are designed to combine the greatest possible cargo capacity with seaworthiness and moderate draught. Larger vessels are under construction. The lake ports of Kristinehamn, Karlstad, and Åmål are being improved for this new traffic. In all these ports there is now a depth of at least 13 ft. At Kristinehamn a new harbour has been built, and at Karlstad new quays have been constructed. All three ports have important railway connexions. For itinerary of Trollhättan canal see Göta canal, above.

The **Väddö** canal lies between Väddö and the mainland, and affords a sheltered passage past the Åland Sea from the Stockholm skärgård to the Öregrund skärgård. It was reconstructed in 1904. The total length of the channel from the head of Björköfjord to Singofjord is about 13 miles, or including Björköfjord 24 miles. Of this length $4\frac{1}{2}$ miles are artificial. There are no locks. The mean depth of the channel is $10\frac{1}{4}$ ft. at low and 12 ft. at mean tide. The bottom width is 33 ft., but the opening of the swing bridge which crosses the north part of the canal restricts its use to vessels of under 31 ft. beam. A speed of 4 knots must not be exceeded in the artificial parts of the channel.

The **Uppsala** waterway is the name given to the water route by various channels from Lake Mälaren and the Fyriså to Uppsala. Five miles of the Fyriså have been improved for navigation. There are no locks. This waterway is not always available for navigation on account of the variations in depths of the water. But the greatest impediment is the bridge at the narrow channel of Almare-stäket where the current often runs swift. The depth there does not exceed 9 ft. and the width of the channel 40 ft. The bridge at Flottsund is also very narrow.

256 WATERWAYS, RAILWAYS, AND TELEGRAPHS

TRAFFIC ON CHIEF CANALS AND WATERWAYS OF SWEDEN IN 1915

<i>Canal.</i>	<i>Steamers and motor vessels over 10 tons.</i>	<i>Sailing vessels over 10 tons.</i>	<i>Smaller vessels.</i>	<i>Barges.</i>	<i>Timber Floats.</i>	<i>Total.</i>
Åker . . .	436	43	44	34	306	863
Dalsland . . .	4,757	693	1,088	1,377	3,187	11,102
Eskilstuna . . .	448	8	559	249	—	1,264
Göta . . .	2,345	899	429	910	35	4,618
Hjälmaré . . .	616	12	55	507	274	1,464
Karlsberg . . .	113	161	3,650	388	—	4,312
Karlstad-Forshaga . . .	39	—	—	163	225	427
Kinda . . .	1,106	38	745	1,031	250	3,170
Örebo . . .	1,238	62	632	218	—	2,150
Säffle . . .	1,171	444	—	197	90	1,902
Snäcke . . .	196	32	170	10	48	456
Stora Le . . .	100	—	274	194	—	1,806
Strömsholm . . .	493	0	—	1,825	168	2,486
Södertälje . . .	2,941	1,373	83	1,946	317	6,660
Tisnare . . .	—	—	30	168	—	198
Trollhätte . . .	7,827	655	9	1,268	77	9,836
Väddö . . .	825	344	896	631	23	2,719

(These figures are the total of vessels up and down each canal.)

The use to which the Swedish waterways are put is indicated by the following figures for the total traffic in 1915, including all steamers, motor and sailing vessels, and barges over 10 tons.

TOTAL TRAFFIC ON CANALS AND WATERWAYS OF SWEDEN IN 1915

	<i>Total vessels.</i>	<i>Net tonnage.</i>
Waterways of Vänern and Vättern . . .	29,051	1,624,023
Waterways of Mälaren and Hjälmarén . . .	38,181	1,777,864
Small waterways communicating with the sea . . .	15,071	3,439,654
Small waterways not communicating with the sea . . .	1,220	13,868

In addition to this traffic 45,526 timber floats traversed the waterways. These were specially numerous on the smaller waterways. This figure does not include the timber floats on the rivers unnavigable for other craft.

RAILWAYS

Swedish Railways

The railways of Sweden at the end of 1916 totalled 9,297 miles, which in proportion to the population is more than any other country in Europe. In relation to area, however, it is a comparatively small figure, owing to the vast untraversed areas in northern Sweden. The central feature of the Swedish railway system is a trunk line running the whole length of the country from Haparanda on the Finnish frontier to Malmö on the Sound, a total distance of 1,087 miles. This trunk line runs at some distance from the coast, but has branches to all the chief ports on the Baltic, Kattegat, and Sound. There is no railway bridge over the Torneälven to the Finnish railways, and transit is by ferry between Haparanda and Torneå station, but in July 1916 the Russian Government sanctioned a railway bridge which is now under construction by the Swedish Government. By this route all the main traffic between western Europe and Russia passed during the first three years of the war.

Railway connexions with Denmark and Germany are made by train ferries. These run from Hälsingborg to Helsingör, Malmö to Copenhagen, and Trälleborg to Sassnitz. Train ferries are proposed between Göteborg and Frederikshavn in Denmark. There is no train ferry across the Gulf of Bothnia to Finland, but it is proposed to start one to Åbo from Kapellskär which is to be connected with rail to Stockholm. Ferries from Göteborg to Frederikshavn and Göteborg to Immingham or Grimsby are also projected.

The main trunk line has three branches to Norwegian ports. In the north the difficult Lapland railway runs from Boden to Narvik (271 miles), the greater part of its length being north of the Arctic Circle. It rises to a height of 1,828 ft. Farther south is a line from Bräcke to Trondhjem (211 miles), and in central Sweden there is a line from Örebro direct to Kristiania (231 miles). This last route is the easiest of the three. A fourth route, in the south, links Göteborg

by a comparatively easy line via Mellerud to Kristiania (220 miles).

While the northern half of Sweden has few railways except the trunk line and its branches to various ports, the central and southern parts have a profusion of lines in all directions. This applies particularly to Skåne in the extreme south.

Railways following the coast are few except in the south. The deep indentations force the lines to follow a more inland course. The chief exception is the line from Hälsingborg to Göteborg which for most of its course runs near the coast, and the line from Trälleborg to Ystad. The line from Mellerud to Kristiania runs very near the coast in Norway.

No purely strategical lines have been built in Sweden, but the plans of every projected line must be submitted to the general staff before being passed. It should be noted that a line runs parallel to the Swedo-Finnish frontier for a distance of 44 miles.

Ownership.—At the end of 1916 there were 3,076 miles of state lines and 6,221 miles of private lines. For most private lines the state provided loans on favourable terms to help the construction, and from time to time the state has purchased lines built by private enterprise. A commission appointed in 1918 to investigate the proposal that the State should take over all the private lines, reported in favour of the project.

Construction.—The gauge of the Swedish trunk line is 1·435 metre (4 ft. 8½ in.), the same as the Norwegian and Danish gauge. The Finnish gauge is 5 ft. All the state railways and 65 per cent. of the private lines have standard gauge. The remainder of the private lines have narrow gauges. The most usual is 0·891 metre (2 ft. 10¼ in.), but some have a gauge of 1·067 metre (3 ft. 6 in.) and a few have gauges of different widths down to 0·6 metre (2 ft.). A common gauge is 0·891 metre (2 ft. 11 in.).

The Swedish railways are single tracked, with the following exceptions: Stockholm to Uppsala, 41 miles; Stockholm to Rönninge, 18½ miles; Malmö to Hässleholm, 51 miles; Göte-

borg to Jönsered, 9 miles ; and a few short stretches of the private lines amounting to a total of 16 miles. Double tracks will probably be laid on many of the chief lines in Sweden.

The weight of rails on the state railways varies from 18 to 27 lb. per foot, the latter being found on all the chief lines. On the standard gauge private lines the weight is $11\frac{1}{2}$ to 30 lb. per foot, and on the narrow-gauge lines $6\frac{1}{2}$ to 22 lb. Steel rails are used on the state lines and both steel and iron rails on the private lines. The rails are usually of British, German, or Belgian manufacture. Sleepers are made of home-grown wood, and so low is their price that until lately it was not considered worth while to impregnate them with pitch.

On the chief standard gauge lines the highest gradient is as a rule 1 per cent., but on the northern lines to Norway it is more. The smallest radius of curvature on the main lines is 1,000 ft.

Bridges and Tunnels.—The numerous rivers of Sweden running across the country and heavily swollen at certain seasons necessitate a great number of bridges on the railways, which are a source of weakness from a military point of view. Many of the bridges are high above the water-level. They are most numerous north of Stockholm on the main line.

There are not many tunnels except on the Lapland railway, where the largest one is the Nuolja tunnel, 963 yds. long. A tunnel, 474 yds. long, carries the main line into Stockholm from the south under a southern suburb of the city, and on the Stockholm–Saltsjöbaden line is a tunnel 700 yds. long.

Rolling-stock.—At the end of 1917 the approximate returns for the rolling-stock were as follows :

<i>Gauge (metre).</i>	<i>Locomotives.</i>	<i>Carriages.</i>	<i>Wagons.</i>
1.435	2,062	3,778	46,600
1.093	10	19	351
1.067	61	114	1,420
0.891	211	506	6,665
0.802	10	12	270
0.600	16	22	216
1.435 (electric)	32	—	—
Total	2,402	4,451	55,522

Of these totals 1,032 steam locomotives, 30 electric locomotives, 2,472 carriages, and 26,020 wagons, all of standard gauge, belonged to the State.

During the last few years a number of locomotives have been made with super-heating arrangements for the steam, on Schmidt's system. Specially powerful locomotives are built for the ore traffic on the Lapland railway.

All the long-distance trains have bogie corridor carriages, and automatic vacuum brakes.

The ore-traffic demands specially constructed wagons. Six-wheeled ore wagons, built of iron, have a carrying capacity of 35 tons each, and eight-wheeled bogie wagons of a newer type have a carrying capacity of 36 tons. The heavy ore trains on the Lapland railway are all fitted with the Westinghouse brake. There are special treble-walled refrigerator wagons for butter and other perishable produce.

Railway Workshops.—The rolling-stock is manufactured in Sweden. Works at Trollhättan have an average output of 50 locomotives a year, and works at Motala an average of 30. There are also railway works at Stockholm, Göteborg, Karlstad, Kristianstad, Falun, Södertälje, Arlöf, Hälsingborg, and Linköping. Most of the large railway bridges are made at Stockholm. The chief repairing workshop of the state railways is at Örebro, but there are several others in different parts of the country.

Coal and Electric Power.—Coal is used for fuel on most of the railways. The greater part of it is imported British coal, but on some of the lines Swedish coal from Skåne is used to a small extent. In 1918 the State railways placed a large contract for Spitsbergen coal, but little could be delivered. On a few of the private lines experiments have been made in the use of peat for fuel.

The lack of fuel in Sweden and the abundance of water-power has raised the question of the electrification of the railways. Several lines are now fitted with overhead electric wires, and their length is being added to year by year. The Lapland railway from Kiruna to Riksgränsen, on the Nor-

wegian frontier, has been electrified. The power is supplied from the Porjus waterfall on the Luleälf. Turbines of 50,000 h.p. have been installed, made for a tension of about 4,000 volts, in a chamber blasted out of a hill-side and lying 160 ft. below the surface of the ground. The feed tunnel for the water is 650 yds. long, and the discharge tunnel about 1,300 yds. long, both of them blasted out of the rock. In four transformer stations, at different places along the line, the tension for the contact wires is reduced to about 16,000 volts from 80,000 volts. The transmission wires are supported on three-legged iron pillars about 65 ft. high and at 220 yds. span. The contact wires, which are also suspended on iron posts, are at about 60 yds. span. Part of this electrification was done by a German firm.

Other lines using electric power are : Stockholm-Stocksund-Djursholm with the power-station at Stocksund ; Hälsingborg-Råå-Ramlösa tramway, Stockholm-Saltsjöbaden, and the Klockrike-Borensberg section of the Östergötland railway with its power-station at Nääs.

Speed.—The average speed of trains is slow in Sweden. On the chief lines it is 30 miles an hour for expresses, 22 miles an hour for ordinary passenger trains, and 11 miles an hour for goods trains. On the electrified section of the Lapland railway the express locomotives can attain a speed of 60 miles, but actually make 25–26 miles an hour.

Traffic.—In 1915 the Swedish railways carried 70,000,000 passengers and 47,000,000 tons of goods. Their total receipts were 219,614,000 kr.

Norwegian Railways

Norway has few railways, since the distribution of the population does not demand many, nor does the nature of the country favour their construction. At the end of 1917 there were 2,007 miles of railway in Norway, which is a small number in comparison with the area of the country. Most of the lines are short ones along various valleys to ports at their mouths. Only two lines run through the country from

sea to sea. The Bergen railway opened in 1909 from Bergen to Kristiania was one of the most difficult lines in Europe to construct, and cost £3,330,000. It rises to a summit of 4,270 ft. and has many bridges and 184 tunnels. The longest tunnel is the Gravehals tunnel ($3\frac{1}{2}$ miles). The total length of tunnels is $23\frac{1}{2}$ miles. The second trunk line is from Trondhjem to Kristiania. This was easier to construct, as it follows the deep valley of the Glommen most of the way, but through traffic is hindered by a break of gauge at Hamar.

Four lines connect Norway with Sweden—the Lapland railway from Narvik, with steep gradients; the line from Trondhjem; and the lines from Kristiania to Stockholm and Kristiania to Göteborg. The last line and the line from Kristiania to Drammen and Skien are the only important lines which run near the coast, but in both cases there are alternative routes completed or under construction.

There are no train ferries connecting Norway with foreign ports, but there are proposals in Norway to run a train ferry between Larvik or Kristiania and Frederikshavn in Jutland, and another between Kristiansand and Hirshals in Jutland.

Ownership.—Most of the lines originated in private enterprise with or without state aid, but the greater number have since been bought by the government. New lines under construction or projected are nearly all government projects. Of the total mileage of 2,007 miles only 288 are private-owned.

The private lines include several mineral lines. The Dunderlandsdal railway, 12 miles long, joins the port of Mo on Ranen-fjord to the iron mines at Storfoshei. The Sulitjälma railway (narrow gauge) runs from Fagerli, by the copper mines at Furuland to Hellarmo and Skjönstaa, on Övre Vand at the head of Skjerstadfjord, a distance of about 20 miles. The Röros mineral line is more important and in 1918 was bought by the State (see Appendix II, Route 88, mile 99 $\frac{1}{4}$).

Construction.—The standard gauge in Norway is 4 ft. 8 $\frac{1}{2}$ in., which is the gauge of 1,240 miles. Of the remaining lines 699 miles have a gauge of 3 ft. 6 in., 16 miles have a gauge of 3 ft. 3 $\frac{1}{2}$ in., and 52 miles have a gauge of 2 ft. 6 in.

A light electric railway connects Majorstuen in Kristiania with Holmenkollen, alt. 1,040 ft. The route winds much and has steep gradients. Another light electric railway opened in 1918 is the Lilleakerbane from Skoiën near Kristiania on the main line to Drammen (Route 94) to Lysaker village about 1 mile north of the main line. It serves a residential district.

Rolling-stock.—A number of locomotives are now made at the Hamar works. Others are imported from Glasgow. The Hamar works builds eight-coupled engines for the Narvik line. These locomotives have a weight of $71\frac{1}{2}$ tons, and the tender weighs $35\frac{1}{2}$ tons. Still heavier ones were on order in 1915. The locomotives on the Bergen railway, which are built in Norway, weigh 98 tons each with tender.

There are at least three American rotary snow-ploughs on the Bergen line.

At the beginning of 1918 the total rolling-stock was as follows :

Gauge. ft. in.	Locomotives.	Carriages.	Wagons.
4 8½	300	929	7,345
3 6	162	533	3,154
2 6	7	22	60
4 8½ } electric	11	7	230
3 3½ }	3	6	64
	483	1,497	10,853

Power.—Proposals are on foot for the electrification of the State railways. At present the Thamshavnbaner and the Rjukanbaner are worked by overhead electric traction.

Projected Lines.—Among the projected lines in Norway the following schemes will probably be started as soon as money is available. The line from Hamar along Gudbrandsdal to Dombaas will be extended to Veblungnäs or Aandalsnäs on Isfjord, a branch of Moldefjord, thus offering a third route between Kristiania and the west coast. Another proposal is to build a branch line from Dombaas by the valleys of the Driva, the Örkla and Soknedal to Stören on the Trondhjem railway. But this line would entail heavy gradients. A

branch of the Bergen line [from Voss by Gravensvand to Eide on Hardangerfjord is projected for tourist traffic.

The Sörland railway from Skien to Kristiansand is under construction, and it is proposed to convert the Kristiania-Drammen line to standard gauge. An important scheme is to join Kongsberg (Route 95) to Notodden (Route 94) via Hjuksebö, and Hjuksebö to Skien and Porsgrund. This is to be standard gauge, and so would link Skien to Kristiania by a standard gauge line. It is further proposed to build a line northward from Kragerö to the Eidelv and Nordsjön. Minor projects include the construction of a funicular railway for tourists up the hill of Flöien at Bergen.

Traffic.—In 1915–16 the total number of travellers on the Norwegian railways was 19,087,218, and the total weight of goods carried was 6,413,481 tons. The total receipts were 46,112,706 kr.

TELEGRAPHS, CABLES, AND WIRELESS STATIONS

Norway

In 1916 the length of the Norwegian telegraph wires and inter-urban telephone wires was 61,707 miles or 14,070 miles of line. There were 1,608 state telegraph offices. Figures are not available for the mileage of railway telegraphs and the number of railway telegraph offices. The trunk line of the Norwegian telegraph system follows the coast to the extreme north and the Russian frontier sending branches to all important places. These branches generally cross the fjords in submarine cables. The Norwegian line ends at Grenze on the Jakobselv or Voriema: telegrams for Russia have to be carried across the river by boat to Finmanskoe, the Russian station on the other side.

Submarine cables from Norway run as follows: Egersund to Peterhead (Scotland), Arendal to Newbiggin (England), Arendal to Cuxhaven (Germany), Arendal to Höjor (Schleswig), Arendal to Hirshals (Jutland), Arendal to Marstrand (Sweden).

Norwegian *wireless telegraph stations*, all on the Telefunken system except Stavanger which is on the Marconi system, are as follows :

<i>Station.</i>	<i>Range.</i>	<i>Owner.</i>	<i>Call letters.</i>
Bergen	{ 270 miles day 800 miles night }	State	I G N
Flekkerö near Kristiansand	160 "	"	L D F
Tjömö, Kristianiafjord	160 "	"	L E T
Stavanger	—	"	—
Röst	35 "	"	L F R
Sörvaag } Lofotens	35 "	"	L E N
Værö }	35 "	"	L E N
Ingö	480 "	"	L E I
Spitsbergen (Green Harbour)	480 "	"	L F G

The Spitsbergen station is owned and staffed by the Norwegian Government. It was erected in 1911 at the same time as the Ingö station by which it communicates with Norway. The Stavanger station is of high power, for long-distance communication.

It is suggested that a chain of low-power stations along the coast of Norway would be of great service to shipping. The Government is considering this proposal as well as the increase in range of one of the Lofoten stations to 200 miles.

Another proposal is to erect a high-power station in eastern Finmark to link the Ingö and Spitsbergen stations with the Murmansk station and others on the north coast of Russia. A station is also proposed at Udsire Island near Skudesnes.

Sweden

The Swedish State telegraph system in 1913 had 21,270 miles of wires, in addition to which there were 2,905 miles of wire used both for telegraph and telephone purposes. Added to this mileage were 18,430 miles of wires owned by the railways which, besides serving railway purposes, were used for general messages. In the same year the number of telegraph offices in Sweden was 2,986, a total which included 514 offices on the state railways, 1,266 offices on private railways, and 1,029 offices which received and dispatched telegrams by telephone to the nearest telegraph office.

The Swedish and Norwegian systems are connected along the railways which link the two countries. The Swedish and Finnish systems meet at Haparanda.

Submarine telegraph *cables* from Sweden are as follows : Malmö to Copenhagen, Marstrand to Newbiggin (England), Marstrand to Arendal (Norway), Marstrand to Skagen (Denmark), Trälleborg to Cape Arkona (Germany), Grisslehamn to Nystad (Finland), Grisslehamn to the Åland Islands.

A cable from Stockholm goes to Gotland, Öland, and Kalmar.

The following are the *wireless stations* in Sweden :

<i>Station.</i>	<i>Range.</i>	<i>Owner.</i>	<i>Call letters.</i>
Göteborg	350 miles	State	S A B
Härnösand	—	„	S A H
Karlskrona	420 „	„	S A A
Fredriksberg near Stockholm	50 „	„	S A D
Tingstade (Gotland)	420 „	„	S A E
Vaxholm	350 „	—	S A F
Trälleborg	250 „	State railways	S A C

APPENDIX I

GAZETTEER OF TOWNS

Most towns in Norway are seaports; inland towns are small and few in number. All towns were originally built of timber and many remain so to the present day, but frequent disastrous fires have led to several being rebuilt in stone and stucco. In the larger towns wooden buildings are no longer allowed. All towns have telegraph and telephone connections. In Sweden there are a number of large inland towns, many of which are prosperous industrial centres, but with few exceptions the most important towns are seaports. Timber buildings are less common than in Norway except in the northern towns. Telegraphs and telephones link all the towns. The figures for population are from the latest official statistics, generally 1915 in Sweden and 1916 in Norway.

Coasting steamers serve all the seaports in Norway and Sweden. In the case of most Norwegian towns they are the only means of communication. In Sweden they are less important.

Details of the opening and closing of Scandinavian seaports are given in Chapter III.

NORWAY

Aalesund, port in Romsdal district, pop. 16,927. Lies on islands of Nörvö and Aspö on outer fringe of skjaergaard. Founded 1824, destroyed by fire in 1904 and since rebuilt in stone. Centre of cod fishing and of steamship lines. Exports, chiefly dried cod to Mediterranean, and cod-liver oil. Harbour 300 yds. long with depth of 6-7 fms.; narrow entrance in 4 fms. Quay with 16 to 18 ft. water. Also quay in deeper

water along S. front of town in Aspevaag. British vice-consul. Three patent slips, respectively 198 ft., 150 ft., and 80 ft., long with lifting capacity of 700 tons, 350 tons, and 150 tons. Small repair shops. No railway. Extensive local steamer connexions.

Arendal, port on Skagerak, pop. 10,310. An old timber-built town on hill at mouth of the Nidelv within the islands of Hisö and Tromö. Important shipping centre. Ship-building and timber trade. Hospital. Large safe harbour with 8 to 20 fms. water. Several quays in 18 to 22 ft. water. One 15-ton crane. Patent slip, 200 ft. long. Repair shops. Narrow gauge railway to Grimstad and Tvetsund (Route 98). Submarine cables to Newbiggin (England), Hirshals (Denmark), Marstrand (Sweden), and Höjor (Schleswig). British vice-consul.

Bergen, port in Søndre Bergenhus amt, the second town of Norway, pop. 90,499. Founded 1075, important town of Hanseatic League. Lies on peninsula at head of Byfjord; commercial port and harbour around bay called Vaagen. Built mainly of stone. Public buildings include town hall, exchange, theatre, museums, fish-market, and large hospital. Tramways. Industries, fishing and shipbuilding, also grain mills, iron foundry, brewing, rope works. Exports fish, salted and canned, and fish oil. Imports, chiefly cereals, coal, tallow and oils, metals and textiles. Roomy anchorage for vessels of all sizes. Extensive wharves in 15 to 22 ft. water, with fifteen fixed cranes (1 to 10 tons), and six travelling cranes (1 to 2 tons), 30-ton electric crane. Three dry docks, 365 ft., 269 ft., and 250 ft. long, 55 ft., 39 ft., and 42 ft., broad respectively; largest capable of taking vessel of 8,000 tons. Three patent slips, 284 ft., 220 ft., and 190 ft. long respectively with lifting power of 2,000 tons, 1,400 tons, and 350 tons. Large repair shops. Has largest steamship fleet in Norway. Railway to Kristiania (Appendix II, Route 92). Wireless station on Rundemanden. British consul and vice-consul.

Bodö, port in Nordland, pop. 5,137. A centre for Lofoten herring fishery. Small quay with 12 ft. water alongside.

Exports chiefly fish. Imports coal, salt, &c. No railway. Hospital. British vice-consul.

Brevik, port on Eidangerfjord, Skagerak, pop. 2,100. Stathelle, pop. 2,066, adjoins across Friersfjord. Exports timber and ice. Imports coal. Good harbour for largest vessels. Small pier for local steamers. Repairs for wooden vessels. Narrow gauge railway to Skien, Kristiania, &c. (Appendix II, Route 94).

Drammen, port at head of Drammensfjord, on west of Kristianiafjord, pop. 25,842, fifth town in Norway. Lies on both sides of Drammenselv, Bragerne on N., Strömsö and Tangen on S. Greater part of town rebuilt after fires in 1866 and 1870. Industries, saw mills, iron works, wood pulp, shipyards. Timber and stone bridges across river. Electric tramways. Two hospitals. Anchorage in mouth of river in 11 to 16 fms. Selvikström, a narrow channel lower down the fjord has depth of 20 ft., to be dredged to 26 ft. Vessels of over 19 ft. draught lie south of Selvikström. Several wharves with 18–20 ft. alongside. Harbour kept open by ice-breakers. Repair facilities, cranes. Exports, wood, pulp, paper, granite, ice, zinc, and nickel ore. Imports, coal, grain, metal work, &c. Narrow gauge railway to Kristiania and Skien (Appendix II, Route 94); standard gauge line Hønefoss and Kongsberg (Route 95). Steamers to Hamburg, Antwerp, London, Grimsby, &c. British vice-consul.

Dröbak, port on E. side of Kristianiafjord, pop. 2,100. Modern watering place. Export of timber and ice. Poor anchorage in 7–12 fms. Small quay in 15 ft. water. Generally head of ice-free navigation of Kristianiafjord. No railway.

Egersund, port on SW. coast, behind Egerö Island, pop. 3,270. Earthenware factories, head-quarters of mackerel fishery. Roomy anchorage in sound for largest vessels. Town anchorage fit only for vessels drawing under 14 ft. Quays with 13–14 ft. water alongside. Exports, fish and hardware. Imports, coal and china clay. On narrow gauge line from Stavanger to Flekkefjord (Appendix II, Route 101). Cable to Peterhead, Scotland.

Flekkefjord, port on Flekkefjord on SW. coast, pop. 2,520. Tanneries. Hospital. Exports, leather, fish, and barrel staves. Imports, coal, salt, and hides. Good anchorage in 9–17 fms. near town. Wharf in 17 ft. water. Repairs. Narrow gauge railway to Stavanger (Appendix II, Route 101). British vice-consul.

Fredrikshald, river port on both banks of Tistedalselv at its entrance to Idefjord, pop. 12,331. Ancient frontier town ; on SE. is obsolete fortress of Fredriksten, alt. 400 ft. Principal buildings, town house, market, fish market, and hospital. Industries, saw mills, pulp mills, quarrying, shipbuilding. Exports, timber, wood pulp, granite. Imports, coal, grain, &c. Outer harbour with depth of 7–8 fms., inner harbour 4–5 fms., both well sheltered. Svinesund, the channel of approach, boundary between Norway and Sweden, difficult to navigate. Wharves in 17–18 ft. water. Repair shops. Railway to Kristiania and Göteborg (Appendix II, Route 64). Steamers by Fredrikshald canal (p. 244) to Orje, &c. British vice-consul.

Fredrikstad, port at mouth of River Glommen on Kristianiafjord, pop. 16,434. Town in two parts, connected by steam ferry ; Forstad on right bank, busiest part, Vaterland on left bank. Principal Norwegian timber port. Shipbuilding yards. Anchorage restricted near town in Vestreelv and Östreelv on two sides of Kragerö in 6–10 fms. Better anchorage at Leret 5 miles S. of town in Vestreelv in 12–16 fms. Wharves in 13 ft. water. Floating dock 212 ft. long, 56½ ft. wide, with lifting capacity of 1,850 tons. Crane to lift 100 tons. Repair shops. Two hospitals, one of which for cholera. Exports, timber, wood pulp, granite, and fish. Imports, coal, &c. Railway to Kristiania, Sarpsborg, and Göteborg (Appendix II, Route 64). Steamers up Glommen to Sarpsborg ; also to London, Rotterdam, Hamburg, &c. British vice-consul.

Gjøvik, town on Mjösen in Kristian amt, alt. 415 ft., pop. 4,312. Railway to Roa and Kristiania (Appendix II, Routes 93 and 92). Steamers to Hamar and Lillehammer.

Grimstad, port on Skagerak, pop. 2,193. Industries, boat and shipbuilding, export of timber. Good anchorage in 6–10 fms. Small jetty. Narrow gauge railway to Arendal and Tvetsund (Appendix II, Route 98).

Hamar, town on Mjösen in Hedemarken amt, alt. 415 ft., pop. 6,168. Railways to Kristiania and narrow gauge to Trondhjem (Appendix II, Route 88), to Dombaas (Route 90). Steamers to Gjøvik.

Hammerfest, port in Finmark, most northerly town in the world, pop. 3,210. Timber-built. Cod-liver oil and train oil factories. Wharf in 16 ft. water. Slip for vessels under 200 tons. Two hospitals. Port for Arctic produce. Exports, fish and furs. Trade with Arctic Russia. British vice-consul.

Haugesund, port on Karmsund, W. coast, pop. 16,594. Shipbuilding. Herring fishery. Exports chiefly herrings, mackerel, and lobsters. Imports, coal, salt, &c. Anchorage restricted and unsuitable for large vessels. Small repairs. Patent slips of 260 ft., 110 ft., and 104 ft., length and lifting power of 3,000, 350, and 350 tons respectively. No railway. British vice-consul.

Holmestrand, town on Kristianiafjord, pop. 2,244. Watering-place. Trade in timber. Wooden mole north of which is anchorage in 6 fms. Narrow gauge railway to Skien and Kristiania (Appendix II, Route 94) and Eidsfos and Vittingfos (Route 96).

Hønefos, town on Baegna in Buskerud amt, alt. 315 ft., pop. 2,788. Saw mills and paper mills. Bridge across river. Railways to Bergen and Kristiania (Appendix II, Route 92), to Tyrifjord and Drammen (Route 95).

Horten (with Karl-Johansvaern), naval port on Kristianiafjord, pop. 10,392. Head-quarters of Norwegian navy. Modern town, watering-place, no industries except naval arsenal. Little trade except import of coal. Hospital, observatory, naval establishment. Large repairs at dockyard. Quay for vessels of 20 ft. draught. Good anchorage in 4 to 16 fms. Government dry dock 346 ft. long, 60½ ft.

wide. Narrow gauge railway to Skoppum, Skien, and Kristiania (Appendix II, Route 94).

Kongsberg, town on Laagenelv in Buskerud amt, alt. 488 ft., pop. 6,978. Owes its rise to silver mines now almost exhausted. On both banks of river which is crossed by two bridges. Timber-built. Smelting works. Railway to Drammen (Appendix II, Route 95).

Kongsvinger, town in Hedemarken amt, alt. 483 ft., pop. 1,821. Timber-built, on r. bank of Glommen. Fortress abandoned in accordance with convention of Karlstad 1905. Station across river. Railways, Kristiania to Mellerud (Appendix II, Route 65), to Elverum (Route 89).

Kragerö, port at entrance to Kilefjord on the Skagerak, pop. 4,121. Old timber-built town. Industries, shipbuilding, artificial manure from apatite; iron mines at Langö. Exports, timber, ice, wood pulp, manure. Imports, coal, &c. Hospital. Harbour good but small; freezes in winter. Quay for vessels drawing less than 12 ft. Small repair shops. No railway. British vice-consul.

Kristiania, capital of Norway, at head of Kristianiafjord and on Akerselv, pop. 259,227. Founded in 1624 by Christian IV to N. of old fortress of Akershus to replace ancient capital of Oslo (founded 1058) on E. bank of river, destroyed by fire that year. Town suffered much from fires and now built largely in stone and brick. Streets wide, regular, well paved, and clean; main street, Karl-Johans Gade from railway station to palace. Principal buildings, Stortings-Bygning, university (founded 1811; 1,500 students), museums, royal palace, Akershus fortress (now partly prison; obsolete as fortress), banks, &c. General and cholera hospitals. Electric tramways. Industries, ship-building, cotton and paper mills, engine works, nail factories, &c. Port available for largest vessels. Ample wharfage in 20-27 ft. water. Electric cranes with lifting capacity up to 20 tons. Grain elevator. Two dry docks, respectively 281 and 574 ft. long, $46\frac{1}{2}$ and $76\frac{1}{2}$ ft. wide. Four floating docks from 150 to 320 ft. long, 39 to 61 ft. wide and lifting

capacity from 1,000 to 4,500 tons. Ample repair facilities. Ice-breakers keep port open all winter. Exports, timber, pulp, butter, fish, &c. Imports, coal, cereals, fats, metals, and manufactured goods. Railways to Bergen (Appendix II, Route 92), Trondhjem (Route 88), Göteborg (Route 64), narrow gauge to Drammen (Route 94), and suburban railways. Steamers to coast ports and Frederikshavn, Hull, Newcastle, London, Hamburg, &c. British consul and vice-consul.

Kristiansand, port on Skagerak, pop. 17,037. On plain at mouth of the Otteraa; rebuilt in 1892 after repeated fires. Streets wide and regular. Buildings low and largely of stone. Civil and military hospitals; quarantine station for south of Norway on Odderö. Industries, shipbuilding, fishing, nickel-ore refining and wood-pulp mills. Exports, timber, pulp, fish, nickel, &c. Imports, coal, grain, nickel-ore, &c. Harbour divided by Odderö into Västrehavn and Östrehavn. Västrehavn large, well sheltered, and easily accessible; depth up to 25 fms. Östrehavn is a poor harbour for large vessels. Ample quay space for large vessels. Government dry dock, 330 ft. long and 52 ft. broad. Repair shops. Small naval establishment in Topdalsfjord to E. Railway (narrow gauge) inland to Byglandsfjord (Appendix II, Route 100). Wireless station on Outer Flekkerö. British consul and vice-consul.

Kristiansund, port in Romsdal, pop. 17,490. Built on three islands, which enclose harbour, in outer skjaergaard. Islands linked by service of steam launches. Buildings of wood, town irregular, and streets steep. Industries, cod-fishing and shipbuilding. Exports, dried cod, cod roe and oil, fresh and salt herrings, and butter. Imports chiefly salt and coal. Restricted anchorage in 10-20 fms. Quays with 14 ft. water alongside. Cranes to lift 1 to 4 tons. Patent slip 200 ft. long with lifting power of 1,600 tons; four other small patent slips 60-150 ft. long for small vessels. Two small repair shops. No railway. British vice-consul.

Larvik (Laurvik), port at mouth of Laagen on Larviksfjord,

Skagerak, pop. 9,853. Trading and manufacturing centre. Industries, saw mills, shipbuilding, quarrying, and whaling. Limited anchorage for vessels of all sizes. Vessels of 24 ft. draught can lie alongside wharf. Also wharf for vessels under 12 ft. draught. Two piers with 16–23 ft. water alongside connected to railway, 15-ton crane. Poor facilities for repair. Exports, timber, wood pulp, granite, ice. Imports, coal, grain, &c. Narrow gauge railway to Skien and Kristiania (Appendix II, Route 94). British vice-consul.

Levanger, port on Trondhjemfjord, pop. 1,808. Frequently burnt down, last time in 1897. Good sheltered anchorage in 6–13 fms. Fairs in December and March frequented by Lapps and Swedes. Railway to Hell for Trondhjem (Appendix II, Route 87).

Lillehammer, town at north of Mjösen in Kristian amt, alt. 588 ft., pop. 4,835. Railway from Kristiania to Dombaas (Appendix II, Routes 88 and 90). Steamers to Gjøvik.

Lillesand, port on Skagerak, pop. 1,134. Losing its importance in favour of Kristiansand and Arendal. Timber export, tannery. Good roomy harbour with 6–20 fms. depth. Short pier for small vessels. Light railway inland to Flakkevand (Appendix II, Route 99).

Mandal, southernmost port in Norway, pop. 3,023. Consists of Mandal, Malmö, and Kleven and lies partly on rocky islets and partly at mouth of Mandalelv. Built of wood. Large saw mills and rope factory. Exports, timber and fish. Imports, coal, grain, &c. Only very small vessels can reach town; larger vessels lie at Kleven in 9–10 fms. Small quay at Kleven in 22 ft. water. Hospital. No railway. British vice-consul.

Molde, port on Moldefjord in Romsdal, pop. 3,459. Built of wood, destroyed by fire in 1917 and partly reconstructed. Now principally tourist resort. Anchorage in 8 to 19 fms. Quay for coasting vessels. No railway. British vice-consul.

Moss, port on E. of Kristianiafjord behind Hjellö, pop. 8,724. Old timber-built town. Watering-place. Industries, shipbuilding and saw mills. Hospital. Bridge to Hjellö

across Moss canal. Anchorage in Verle Bay S. of Moss in 6–8 fms. exposed to SW. ; anchorage N. of Moss in 11–16 fms. Depth in Moss canal 17 ft.. Wharves 6,000 ft. long in 18–23 ft. water. Two floating docks 142 ft. and 108 ft. long, each 44 ft. wide and with lifting capacities of 860 and 600 tons ; two can be used together. Three small patent slips, longest 180 ft. in length. Repair shops. Floating 30-ton and 60-ton cranes ; fixed 60-ton crane. Exports, timber, wood pulp, and ice. Imports, coal, grain, &c. Railway to Kristiania, Fredrikstad, and Göteborg (Appendix II, Route 64). British vice-consul.

Namsos, port in Nordre Trondhjem, pop. 2,395. Built of wood, partly destroyed by fire 1872 and 1897 and rebuilt. Saw mills and pulp mills. Exports chiefly timber and pulp. Nearest port to Grong copper mines. Small shipbuilding yard. Accessible to large vessels ; small quays with 20 ft. water alongside. No railway. Hospital. British vice-consul.

Narvik (Victoriahavn), port in Nordland, pop. 6,179. Founded in 1902 as ice-free port for terminus of Lapland railway. Built of wood on rising ground. Harbour $1\frac{1}{2}$ sq. mile ; depth 9–14 fms. Extensive quays for ore shipment in 28 ft. water. Electric haulage, cranes, ore-shoots. Repairs. Slip for small vessels. Railway to Sweden (Appendix II, Route 85). British vice-consul.

Porsgrund, port on Skienelv, Skagerak, pop. 4,765. Manufactures porcelain. Exports timber and ice. Imports coal, &c. Anchorage in 4 to 8 fms. Harbour kept open by icebreakers in winter. Quay 300 ft. long in 22 ft. water. Cranes and shearlegs. Floating dock 241 ft. long, $50\frac{1}{2}$ ft. wide, with lifting capacity of 1,600 tons. Narrow gauge railway to Skien, Brevik, Kristiania, &c. (Appendix II, Route 94). British vice-consul.

Risør, port on Skagerak, pop. 2,995. Town on peninsula between Sandnesfjord and Söndeledfjord. Outer harbour good but depth ; inner harbour small, depth 5–7 fms. Small wharf in 15 ft. Repairs to wooden ships. Shipbuilding.

Harbour occasionally freezes in winter. Exports timber, wood pulp, ice. Imports coal. No railway. British vice-consul.

Sandefjord, port at head of Sandefjord on Kristianiafjord, pop. 5,381. Shipbuilding town and watering-place; medicinal springs. Good anchorage in 3 to 7 fms. Quay for small vessels. Three floating docks respectively 237, 150, and 359 ft. long and 44, 44, and 65 ft. wide with lifting capacities of 1,600, 900, and 5,550 tons. Large repair shops with 15-ton and 30-ton cranes. Exports, pit-props, &c. Imports, coal, &c. Narrow gauge railway to Skien and Kristiania (Appendix II, Route 94).

Sarpsborg, river port on the Glommen, $7\frac{1}{2}$ m. above Fredrikstad, pop. 12,968. Founded 1840 on site of town destroyed by Swedes in 1567. Great trade in timber which is floated down river. Industries, saw mills, pulp and paper factories, electric power station for all factories to Fredrikstad. Power from Sarpsfos fall to SE. of town, 80 ft. high, 164 ft. wide, 50,000 h.p. of which 1,200–3,000 used in turbines. Combined railway and road suspension bridge over falls. Port with quay at Sandesund, $1\frac{1}{2}$ m. down Glommen, accessible to vessels drawing under 21 ft.; electric cranes. Railways to Fredrikstad, Kristiania, and Göteborg (Appendix II, Route 64) Steamers to Fredrikstad. British vice-consul.

Skien, river port on Skienelv about 7 miles above Porsgrund, pop. 16,319. One of the oldest towns in Norway; often burnt down but rebuilt in timber. Hospital. Exports timber, wood pulp, copper and iron ore, and ice. Imports coal, grain, textiles, &c. Vessels of 20 ft. draught can reach Skien. Quays in 18 ft. water. Narrow gauge line to Kristiania, &c. (Appendix II, Route 94). British vice-consul.

Stavanger, port in Stavanger amt, pop. 43,870. One of the oldest towns in Norway, now built largely of stone. Industries shipbuilding, fishing, and fish-canning. Imports chiefly coal, grain, tin and iron plate. Exports salted and canned fish. Somewhat restricted anchorage in 11–14 fms. Over 1,000 ft. of wharves with 9 to 17 ft. water alongside. Two dry docks,

295 and 224 ft. long respectively and 43 ft. broad. Patent slip, 145 ft. long, 1,000 tons lifting power. Extensive repair shops. Two hospitals. Narrow gauge railway to Flekkefjord (Appendix II, Route 101). High power wireless station. British vice-consul.

Stenkjaer, port on Beitstadjord at head of Trondhjemfjord, pop. 2,568. Rebuilt after fire in 1900. Large timber trade. Railway to Levanger and Hell (Appendix II, Route 87).

Svolvaer, capital and chief port of Lofoten Islands, pop. fluctuates, small in summer and increased by many thousand during cod and herring fisheries. Built of wood. Small quay. Exports, fish and fish guano. British vice-consul.

Tönsberg, port on Kristianiafjord, pop. 11,147. Oldest town in Norway but lost importance since middle ages. Now head-quarters of Norwegian whaling industry and growing rapidly. Built of wood. Ample sheltered anchorage for large vessels. Wharf in 16 ft. water. Harbour frozen in winter but channel kept open. Small repairs. Patent slip for vessels of 1,000 tons. 15-ton crane. Exports, whale oil, pitch, butter. Imports, coal, petroleum, iron, &c. Narrow gauge railway to Skien and Kristiania (Appendix II, Route 94). British vice-consul.

Tromsö, port in Finmark, pop. 9,317. Thriving town built of wood and stone. Tanneries, fish-oil factories, boat building. Extensive anchorage for largest vessels. Quays in 23 ft. water. Patent slip, 200 ft. long, 38 ft. broad, and depth $9\frac{1}{2}$ ft. forward and $17\frac{1}{2}$ ft. aft; lifting power 500 tons. Eight smaller slips. Hospital. Trade in fish, furs, and Arctic produce. Chief port for Spitsbergen. British vice-consul.

Trondhjem (Drontheim), port in S. Trondhjem amt, pop. 53,225. One of oldest towns in Norway, capital of country till 1380, and still place of coronation of Norwegian sovereigns; third city of country in number of population. Built round mouth of Nidelv on south of Trondhjemfjord. Streets wide and regular. Buildings chiefly of wood. Public buildings include cathedral (Domkirke), exchange, theatre, museum, nautical school, large scientific library, hospital, leper infirmary,

lunatic asylum, deaf and dumb asylum. Tramways. Dockyard and arsensal S. of cathedral on Nidelv. Industries, shipbuilding, foundry, machine shops, saw mills, tannery, distillery, &c. Exports chiefly sulphur pyrites, salted herrings, timber, and wood pulp. Imports chiefly coal, machinery, and grain. Harbour includes Elvehavn (river harbour), Ydrehavn (outer basin), and Kanalhavn (inner basin) all connected with each other; total area about 120 acres; depths 16–23 ft. Wharfage about 4,000 yds. in 15–19 ft. water. Ample cranes. Railway siding on wharves. Two dry docks 310 ft. and 280 ft. long, 44 and 43 ft. broad; 30-ton electric crane and steam cranes of 12, 8, and 4 tons. Three patent slips, 140 ft., 130 ft., and 112 ft. long respectively with lifting power of 500 tons, 400 tons, and 400 tons. Repair shops. Railways to Kristiania (narrow gauge) and to Sweden (Appendix II, Routes 88, 82). British vice-consul.

Vadsö, port on N. of Varangerfjord, pop. 2,067, half Finnish. Called Cacce-Suollo by Lapps and Vesi-Saari by Finns. Timber built. Small hospital. Trade in fish, oil, and guano. Much frequented by Russian schooners. Open all winter. British vice-consul.

Vardö, port on island off eastern end of Finmark, pop. 3,488. Timber built. Small hospital. Anchorage in 3 to 14 fms.: quays with 20 ft. water alongside, and tramway. Trade chiefly in fish and oil, largely with Arctic Russia. Open all winter. British vice-consul.

SWEDEN

Åhus, port in E. of Skåne, pop. 3,800. Lies on N. bank of Helgeå, 1 m. from mouth. Seaport of Kristianstad. Exports, granite, paper, cement, pitprops, &c. Imports, coal, grain, manure, oil cake. Port in river mouth, entrance between two moles. Anchorage in 19 ft. Ample wharves in 10–17 ft. water, with railway lines. Cranes up to 12 tons. Obstructed for sailing vessels December to February. Railway to Efveröd and Eslöf (Appendix II, Route 14), to

Kristianstad (Route 15). British vice-consul (Ystad and Åhus).

Ängelholm or Engelholm, port on Kattegat, pop. 4,000. Town lies on Ronneå 2 m. from sea. Fishing and agricultural centre; tanneries. Harbour formed by two piers off river mouth, 148 ft. apart; $6\frac{1}{2}$ ft. depth. Off town 3 ft. depth. Railways to Göteborg and Hälsingborg (Appendix II, Route 45), to Ljungby (Route 46), and to Åstorp (Route 2).

Borås, town in Älfsborgs län, pop. 23,577, on Viska. Woollen and cotton manufactures, foundries. Railways to Göteborg and Värnamo (Appendix II, Route 57), to Varberg (Route 53), to Vänersborg (Route 58).

Borgholm, port and capital of Öland, pop. 1,120. Watering-place. Small artificial harbour accessible to vessels of 11 ft. draught. Quay in 16 ft. water. Obstructed by ice December to April. Exports, grain. Centre of Öland narrow gauge railways (Appendix II, Route 80). British consular agent.

Eskilstuna, town in Södermanland, pop. 29,616. Seat of Swedish steel industry, gun factories. Canalized river to Lake Mälaren (see p. 248). Railways to Södertälje and to Kolbäck (Appendix II, Route 35).

Falkenberg, port on Kattegat, pop. 4,300. Salmon fishing. Obsolete fortress. Small artificial harbour; depth 13 ft. Small repairs. Railways to Göteborg and Hälsingborg (Appendix II, Route 45), narrow gauge to Limmared (Route 51).

Falun, capital of Kopparbergslän, pop. 12,000. Lies on both banks of Falua near Tisken, a gulf of Runnsjön. Centre of copper works, also carriage and machine factories. Railways to Gäfle, Göteborg, Mora, and Björbo (Appendix II, Route 61).

Gäfle or Gefle, port on Gulf of Bothnia, pop. 36,494. Capital of Gäfleborgs län lies at head of bay at mouth of Gäfleå, rebuilt since fire in 1869. Industries, shipbuilding, tanning, pottery, cloth mills. Hospital. Tramways. Anchorage in outer roads, in 7-9 fms.; inner harbour 13-18 ft. now being deepened. Quay at Fredriksskans at entrance to inner harbour in 23 ft. water; railway. At town about $2\frac{1}{2}$ miles

of quays in 13–18 ft. Also quays in deeper water at Korsnäs and other places outside harbour; railways. Patent slip 218 ft. long, 57 ft. wide, lifting power 1,250 tons. Large cranes. Extensive repair shops and foundries. Generally closed by ice January to April. Exports, iron ore, timber, and wood pulp. Imports, coal, oil, machinery, manure, &c. Railways to Stockholm (Appendix II, Routes 74 and 72), to Enköping (Route 75), to Ockelbo (Route 76). British vice-consul.

Göteborg or **Gothenburg**, port on the Kattegat, pop. 186,365. Second town in Sweden, lies on l. bank of Götaälf, on broad plain, 4 miles from mouth. Founded 1619, capital of Göteborg och Bohus län. Canals and moats of old town mostly filled up and only Storahamn Canal now navigable. Many large buildings including schools, museums, and churches; cathedral; four railway stations; electric tramways. Industries, iron and steel works, engine works, shipbuilding yards, wood pulp and sugar refineries, cotton factories, &c. Harbour in river, depths 17–24½ ft.; depth of channel of approach 24½ ft. Extensive quays on both sides of river with railway connexions; vessels up to 20 ft. draught can lie alongside. Works in progress for construction of new quays in deep water. Dry dock, 410 ft. long, 58 ft. broad, and 19½ ft. deep. Floating dock for vessels up to 12,000 tons. Four patent slips 195–225 ft. long with lifting power of 600–1,500 tons. Cranes up to 60 tons. Repair shops. Harbour kept open by ice-breakers all winter. Exports, machinery, timber, wood pulp, paper, iron and iron goods, zinc-ore, agricultural produce, fish, &c. Imports, coal, oil, machinery, grain, oil cake, manure, salt, &c. Railways, to Varberg and Hälsingborg (Appendix II, Route 45), to Borås and Värnamo (Route 57), to Stockholm (Route 58), to Mellerud for Kristiania (Route 61), to Strömstad (Route 62), and narrow gauge to Skara and Lidköping (Route 59). Land route to Stockholm by Göta Canal (see p. 250). Steamers to Leith, Hull, Harwich, Kristiania, Copenhagen, Frederikshavn and Lübeck, also to Australia, South Africa, South America, &c. Wireless

station near Carnegieska factory, $2\frac{1}{2}$ m. downstream from town. British consul-general, consul, and vice-consul.

Grisslehamn, port on Vaddö, Åland Sea. Lies on construction of Vaddö and has two harbours, one on Åland Sea which is exposed, and one on Ornefjord with depth of $10\frac{1}{2}$ ft. ; small pier. Small shipbuilding yard. Cables to Nystad (Finland) and Åland Islands.

Halmstad, port on Kattegat, pop. 18,783. Capital of Hallands län. Wool and cloth factories, flour mills, steam and turbine engines, and dairy machinery. Two piers each 164 ft. apart in line with mouth of Nisså from entrance to inner harbour. Depth in inner harbour 14 ft. East pier turning at angle forms outer harbour ; depth, 14 ft. Long coal wharf in $15\frac{1}{2}$ ft. water. Small repairs, 10- and 4-ton cranes. Exports, granite, wood pulp, and rafters. Imports, coal, grain, iron. Railways to Göteborg and Hälsingborg (Appendix II, Route 45), to Värnamo (Route 49), and narrow gauge to Karlshamn (Route 48). Steamers to Hamburg, Lübeck, Newcastle, &c. British vice-consul.

Hälsingborg or **Helsingborg**, port on the narrowest part of the Sound, pop. 35,407. Lies at foot of low range of hills. Old town around Kärnan, an old castle ; newer port, more open to north and south ; factories in southern part. Three railway stations ; electric tramways. Important agricultural centre. Industries, flour mills, margarine, locomotives, railway carriages, and superphosphate works, shipbuilding, breweries, rubber factories, jute mills. Harbour artificial, formed by two overlapping breakwaters ; entrance 154 ft. wide ; total area of basins about 5 acres ; depth 18–22 ft. Quays 3,000 yds. in length, in depths up to 22 ft. Dry dock 275 ft. long, 44 ft. wide, and 16 ft. deep. Electric and steam cranes up to 30-tons. Large repair shops. Harbour kept open by ice-breakers in winter. Exports, timber, live stock, fire clay goods, fish, paper, &c. Imports, coal, machinery, manure, oil cake, grain, &c. Railways, to Ängelholm and Göteborg (Appendix II, Route 45), to Eslöf (Route 43), to Åstorp (Route 44). Train ferry to Helsingör (Denmark). British vice-consul.

Haparanda, frontier town opposite Torneå, Finland, pop. 1,500 (1914), growing rapidly during the war. Lies $1\frac{1}{4}$ m. above mouth of Torneålf. Timber built. Depth in river 3 ft. Small quay. Exports tar and reindeer skins. Chief importance for railway traffic between Russia and west. End of Swedish railways (Appendix II, Route 72). Railway bridge under construction to Finland. Timber foot bridge to Torneå on island in Torneålf. Torneå accessible to vessels drawing 4 ft. Large vessels lie in exposed Røyttä roadstead at mouth of river. British vice-consul.

Härnösand or **Hernösand**, port on Gulf of Bothnia, pop. 9,908. Capital of Västernorrlands län; lies on Hernö and mainland opposite. Industries, saw mills, and shipbuildings; linen mills. Two harbours, N. and S. of town, connected by canal open to vessels of $7\frac{1}{2}$ ft. draught. S. harbour has depth of 9 fms. and short quay in 15 ft. N. harbour has depth of 4–14 fms. and long quay in 1–17 ft., with railway sidings. Patent slip 80 ft. long with 350 tons lifting capacity. Large repair shops. 22-ton crane. Harbour closed by ice December to May. Exports timber and wood pulp. Imports coal, grain, &c. Railway to Långsele on main line (Appendix II, Route 84). Steamers to Nikolaistad (Finland).

Hudiksvall, port on Gulf of Bothnia, pop. 6,000. Lies at head of fjord, one of oldest towns in Sweden, largely rebuilt after fire in 1906. Industries, shipbuilding, wood pulp, saw mills. Safe anchorage in $4\frac{1}{2}$ –9 fms. Large quays in 17–19 ft. water with railway lines. Small patent slip. Closed by ice December to April. Exports, timber, wood pulp, and steel. Imports, coal, iron ore, flour, machinery. Railway to main line at Ljusdal (Appendix II, Route 78), narrow gauge to Bergsjö (Route 79). British vice-consul.

Jönköping, port on Lake Vättern, pop. 28,390. Capital of Jönköpings län, one of oldest towns in Sweden. Manufactures steam engines, turbines, factory machinery. Large match factories. Woollen mills. Railways to Nässjö and to Falköping (Appendix II, Route 1) and narrow gauge to Vireda (Route 55). Steamers to Stockholm.

Kalmar, port and capital of Kalmars län on Kalmar Sund, pop. 16,136. One of oldest towns in Sweden, partly on Kvarnholmen Island, partly on mainland; two parts connected by bridges. Cathedral, town-hall, castle. Industries, saw mills, flour mills, shipbuilding. Artificial port, depths 8–21 ft. 4,000 yds. of wharves in 3–19½ ft. water. 12-ton crane. Port generally kept open by ice-breaker all winter. Patent slip, 195 ft. long, 60 ft. wide, with lifting power of 400 tons. Repair shops. Railway to Nässjö (Appendix II, Route 25), narrow gauge railways to Oskarshamn (Route 27) and to Karlskrona (Route 24). Steamers to Lübeck, Copenhagen, &c. British vice-consul.

Karlshamn or **Carlshamn**, port in Blekinge län, pop. 7,300. Large distilleries. Small sheltered harbour with depth of 18–26 ft. Ample quays in 15–23 ft. water, with railway lines. Large repair shops. Cranes up to 20 tons. Patent slip, 200-ton lifting power. Harbour always open. Narrow gauge railways to Kristianstad and Karlskrona (Appendix II, Route 19), to Vislanda (Route 21).

Karlskrona, port and capital of Blekinge län, pop. 28,536. Lies on several islands connected by bridges. Chief naval dockyard of Sweden. Industries, shipbuilding, foundries, mechanical works, saw and flour mills. Three channels between outer islands into basin where Karlskrona lies; deepest available for largest vessels. Inside are outer roads, extensive anchorage in 4¾–11½ fms. Merchant anchorage NE. of town, 11 fms. and less. Extensive quays in 10–20 ft. water. Seven dry docks, largest 300 ft. long and 68 ft. wide. Repair shops in addition to dockyard. Harbour never closed to steamers. Exports, granite, wood, &c. Imports, coal, oil, machinery, &c. Railways to Växjö (Appendix II, Route 23), narrow gauge to Kalmar (Route 24). Wireless telegraph. Steamers to Lübeck, Copenhagen, &c. British vice-consul.

Karlstad, port on Lake Vänern, pop. 18,722. Capital of Värmlands län, lies at mouth of Klarälf, old town rebuilt with wide regular streets. Manufactures: steam launches,

factory machinery, railway rolling stock, turbines. Saw mills. Trade in timber. Harbour to be improved for large sea-going vessels which can now reach lake. Railways to Kristiania and Laxå (Appendix II, Route 65), narrow gauge to Edebäck and Filipstad (Route 66). Steamers to Vänersborg and Lidköping.

Kristianstad or **Christianstad**, town on Helgesjön, in Skåne, pop. 11,777. Capital of län. Agricultural centre. Industries, flour and wool mills, hardware, locomotive works, foundries. Port at Åhus distant 27 m. by rail. Boats of 2 ft. draught can reach Kristianstad from Åhus. Railways to Åhus (Appendix II, Route 15), to Hässleholm (Route 16), to Älmhult (Route 18), and narrow gauge to Karlskrona (Route 19).

Landskrona, port on Sound, pop. 16,711. Saw mills, wool mills, sugar refinery, barrel and match factories, foundries, large shipbuilding works. Small artificial harbour to be deepened and enlarged; depth 23–26 ft. Quays in 18 ft. water. 18-ton crane. Dry dock for vessels of 15,000 tons. Railway to Åstorp (Appendix II, Route 42 and 2), to Eslöf (Route 43), to Käflinge (Route 10). Steamers daily to Copenhagen. British vice-consul.

Linköping, capital of Östergötlands län, pop. 25,093. Lies on Stångå and Kinda canal (see p. 252). Old Gothic cathedral. Railways to Stockholm and Göteborg (Appendix II, Route 1), to Vimmerby and Oskarshamn (Routes 30 and 28), narrow gauge to Västervik (Route 31), and narrow gauge to Motala and Vadstena (Route 36).

Luleå, port on Gulf of Bothnia, pop. 9,000. Old town rebuilt after fire of 1887, capital of Norrbottens län, lies near entrance to Lulefjord. Industries, shipbuilding, saw mills. Depth in outer harbour, S. of town, $3\frac{3}{4}$ to 10 fms.; in inner harbour N. of town $3\frac{1}{4}$ to $4\frac{1}{2}$ fms., well sheltered. Quays 3,200 yds. long in 9 to 24 ft. water; railway sidings. Also coal wharves in 19 to 25 ft. of water. 20-ton crane. 100-ton hydraulic lift. Patent slip 104 ft. long with lifting power of 260 tons. Port open June to November. Small repairs.

Trade principally in export of iron-ore and timber. Railway to main line at Boden (Appendix II, Route 72). British vice-consul.

Lund, town in Skåne, 11 m. from Malmö, pop. 22,884. One of oldest towns in Sweden, seat of bishop, and of university (1,070 students), founded 1668. Agricultural centre. Industries, flour, saw, sugar, and wool mills; foundries and tinplate factories. Chief buildings are university, museums, and cathedral. Two railway stations. Railways to Malmö, Bjerred, Eslöf, and Harlösa (Appendix II, Route 1), to Trällebörg (Route 9).

Lysekil, port on Skagerak, pop. 4,110. Bathing resort. Trade in anchovies. Fair anchorage in 10 fms. Small wharf. Patent slip 140 ft. long with lifting capacity of 300 tons. Branch railway from Strömstad and Göteborg line (Appendix II, Route 62).

Malmö, port on Sound, pop. 109,571. Capital of Malmöhus län, third city of Sweden. Chief buildings, governor's residence, town-hall, obsolete citadel, banks, three railway stations. Electric tramways. Industries, cotton, flour, and wood mills; soap, shoe, tobacco, and rubber factories; cement and mechanical works; tanneries and shipbuilding. Exports, cement, live-stock, agricultural produce, &c. Imports, coal, machinery, manure, grain, &c. Harbour artificial; four basins, depth 20–21 ft. Entrance channel being dredged to 24 ft. Wharfage of 4,300 yds.; railway sidings. Floating breakwater 140 ft. long to protect outer harbour. Generally open all winter. Two dry docks, respectively 243 ft. and 526 ft. long, 34 ft. and 78 ft. wide. Patent slip, 230 ft. long with lifting power of 1,300 tons. Cranes up to 40 tons. Ample repair facilities. Harbour kept open in winter by ice-breakers. Railways to Stockholm (Appendix II, Route 1), to Ängelholm (Route 2), to Simrishamn (Route 3), to Ystad (Route 5), to Trällebörg (Routes 4 and 6), and to Limhamn (Route 8). Steamers daily to Copenhagen and Lübeck. Cable to Copenhagen. British consul and vice-consul.

Marstrand, port on Skagerak, pop. 1,860. Fishing port and bathing resort. Good but small harbour with depths of 5–7 fms., occasionally frozen in winter. Wharves in 5–15 ft. water. Steamers to Göteborg. Cables to Arendal, and Skagen.

Norrköping, port on Bråvik, Östergötland, pop. 45,768. Fourth town in Sweden, 5 m. from mouth of Motalaström, mainly on r. bank. Several bridges. Industries, paper, wool and cotton mills, iron-foundry, shipbuilding. Four hospitals. Tramways. Anchorage at Pampus roads at mouth of river 5 m. from town in $3\frac{1}{2}$ –8 fms. Channel to town available for vessels of $18\frac{1}{2}$ ft. draught. Ample quays in 15–22 ft. water. Large cranes. Dry dock, 227 ft. long, $35\frac{1}{2}$ ft. wide; can take vessel of 1,000 tons. A patent slip for 6,000-ton vessels under construction. Repair shops. Exports, timber, wood pulp, matches, &c. Imports, coal, raw materials, and manufactured goods. Railways to Stockholm and Malmö (Appendix II, Route 1), narrow gauge to Örebro (Route 33), narrow gauge to Valdemarsvik (Route 32). Steamer to Stettin, Lübeck, Copenhagen, Hamburg, and British ports. British vice-consul.

Nyköping, port and capital of Södermanland län, pop. 10,793. Situated at head of fjord 4 m. from mouth of river. Flour, cotton, and wool mills; foundries. Anchorage in river in 17 ft. Railway quay in 16 ft. water. Small repair shops. Generally closed by ice December to March. Exports, wood and oats. Imports, coal, grain, oil cake, &c. Railways to Norrköping and Stockholm (Appendix II, Route 1), to Eskilstuna and Oxelösund (Route 34). British vice-consul.

Örebro, capital of Örebro län, on Svartå near Lake Hjälmaren, pop. 33,792. Agricultural centre, rebuilt since fire of 1854. Industries, paper mills, machine shops. Railways to Frovi and Mjölby (Appendix II, Route 37), to Karlstad (Route 65), narrow gauge to Norrköping (Route 33). Steamer to Stockholm by Örebro canal, (see p. 252).

Örnsköldsvik, port on Gulf of Bothnia, pop. 3,500. Lies at

head of deep inlet. Industries, saw mills, wood-pulp factories. Harbour with depths of $3\frac{1}{4}$ –14 fms. Ample quays, in 13–23 ft. water, with railway lines. 20-ton crane. Small repair shops. Exports, timber. Imports, coal, salt, &c. Railway to main line at Mellansel (Appendix II, Route 72). Steamers to Nikolaistad (Finland) and Copenhagen. British vice-consul.

Oskarshamn, port on Kalmar Sund, pp. 7,930. Ship-building, tile works. Trade in timber, grain, cattle. Harbour accessible to vessels of 23 ft. draught; depth at anchorage 18–29 ft. Wharves in 9–21 ft. water. Two dry docks, largest $344\frac{1}{2}$ ft. long, 49 ft. wide, other smaller. Large repair shops. 40-ton crane. Seldom closed by ice. Exports, timber and granite. Imports, coal, oil, grain, &c. Railways to Nässjö (Appendix II, Route 28), narrow gauge to Kalmar (Route 27).

Piteå, port on Gulf of Bothnia, pop. 2,700. Timber-built town partly on island of Pitholmen, partly on mainland. Approached by Pitsund with depth of 19 ft. Harbour has depth of 15– $19\frac{1}{2}$ ft. Quays in 5– $16\frac{1}{2}$ ft. water. Other loading places and quays in deeper water further down Sound. Closed by ice December to May. Small repairs. Exports timber and tar. Nearest railway at Älfsby, 33 m. (Appendix II, Route 72).

Simrishamn or **Cimbrishamn**, port in E. of Skåne, pop. 2,130. Tanneries. Port artificial, divided into outer and inner harbours; depth in both $14\frac{1}{2}$ ft. Also basin for fishing boats; depth 9–10 ft. Loading pier in outer harbour 65 yds. long with railway lines. Harbour never closed by ice. Steamers to Bornholm. Railway to Tomelilla (Appendix II, Route 3).

Söderhamn, port on the Gulf of Bothnia, pop. 11,563. Shipbuilding, iron foundries and saw mills. Good anchorage in 14 ft. Larger vessels lie at Stugsund, 1 m. down sound, in 19 ft. Quay at Söderhamn in 14 ft., at Stugsund in 19 ft. Patent slip 200 ft. long with lifting power of 1,000 tons. 20-ton crane. Harbour closed by ice January to April.

Exports, timber, wood pulp, and iron. Imports, coal, grain, manure, &c. Railway to main line at Kilafors (Appendix II, Route 72). Steamers to Stettin, Lübeck, Copenhagen. British vice-consul.

Södertälje, port at S. end of Lake Mälaren, pop. 13,366. Jute mills. Vessels from south approach by Södertälje canal from Hallsfjord (see p. 253). At S. end of canal is a quay, with railway line, in 19 ft. water. Railway to Saltskog for Norrköping and Stockholm (Appendix II, Route 1). Canal steamers to Stockholm and Göteborg.

Sölvesborg, port in Blekinge län, pop. 2,900. Tanneries. Anchorage in outer roads, 2 m. from town in 20 ft. ; in inner roads, 1 m. from town, in 17 ft. ; in town harbour in 17 ft. Quays in outer roads and town harbour in 13–16 ft. water. Cranes up to 15-ton. Harbour kept open by ice-breakers. Dry dock 285 ft. long, 45 ft. wide. Repair shops. Narrow gauge railway to Kristianstad and Karlshamn (Appendix II, Route 19).

Stockholm, capital and principal port of Sweden, pop. 392,427, or with suburbs 440,000. Originated about 1255 on islands in narrow channel leading from sea to Lake Mälaren; now spread over adjoining mainland and other islands. Many times devastated by fire, now built of stone and brick. Streets, except on Staden and Riddarholmen, wide ; many open quays along channels. Chief buildings, Riksdagshus, Royal Palace, Riddarhus, opera house, Högskola (university), Academy of Sciences, Royal Library, museums, &c. Bridges linking various parts of town. Electric tramways. Service of interurban steamers. Industries, telephone apparatus, machine shops, shipbuilding, chemicals, sugar refinery, printing, royal dockyard. Harbour large and well sheltered ; depths 5 to 22 fms. ; several approaches from sea most of which available for vessels of 24 ft. draught. Also approach by Södertälje canal and Lake Mälaren (see p. 253), and through Stockholm lock (see p. 253). Several miles of quays in 10 to 26 ft. water. Admiralty dry dock 411 ft. long, and two other dry docks 330 and 340 ft. long. Five patent slips,

100 to 225 ft. long. Two pontoon docks of which one has lifting capacity of 2,150 tons. Many electric and steam cranes. Extensive repair shops. Harbour always kept open by ice-breakers. Exports, iron, machinery, iron-ore, zinc-ore, timber, hides, paper, &c. Imports, coal, grain, oil, &c. Chief railways, to Malmö (Appendix II, Route 1), to Uppsala and Boden (Route 72), to Kolbäck and Frövi (Route 40), and narrow gauge to Häverösund (Route 70). Steamers to Åbo, Helsingfors, Petrograd, Stettin, Lübeck, &c. British consul and vice-consul.

Strömstad, northernmost Swedish port on Skagerak, pop. 3,000. Watering-place. Industries, shipbuilding and fishing, especially oysters and lobsters. Small hospital. Exports, granite, fish, and live-stock. Imports, coal, salt, grain. Good anchorage in 5-7 fms. Ample wharfage in 10-20 ft. water. Patent slip 165 ft. long with lifting power of 400 tons, takes vessels up to 200 ft. Railway to Göteborg (Appendix II, Route 62).

Sundsvall, port on Gulf of Bothnia, pop. 16,744. Rebuilt in stone after destructive fire in 1888. Industries, shipbuilding, saw mills, fishing. Trade in live-stock and butter from Finland. Outer harbour with depth of 4-14 fms.; inner harbour, 15-26 ft. Ample quays in 15-23 ft. water. Patent slip 146 ft. long with lifting capacity of 100 tons. Large repair shops. Closed by ice December to May. Railway to main line at Ånge (Appendix II, Route 72). Steamers to Nikolaistad in Finland, Stettin, and Lübeck. British vice-consul.

Trälleborg or **Trelleborg**, port in S. of Skåne, pop. 10,939. Old town with flour and sugar mills, shoe and rubber factories, brick, cement, lime works, &c. Harbour artificial, bounded by two curved piers each 640 yds. long; entrance 68 yds. wide; depths 21-23 ft. Ample wharfage with railway lines. Grain elevator; 5-ton electric crane. Small repair shops. Never closed by ice. Exports, grain, sugar, bricks, &c. Imports, coal, grain, oil cakes, &c. Railways to Malmö (Appendix II, Routes 4 and 6), to Lund (Route 9), to Ystad

(Route 4). Daily mail boats to Sassnitz, Germany. Cable to C. Arkona, Germany. Wireless station.

Trollhättan, manufacturing town on Götaälf, pop. 8,000. Lies beside Trollhättan falls which provide power for factories. Practically all foundries and machine works; locomotives, turbines, &c. Steamers to Göteborg and Stockholm by Trollhättan canal, see p. 254. Railways to Göteborg and Mellerud (Appendix II, Route 61), and narrow gauge to Tumbleberg, &c. (Route 59).

Uddevalla, port of Byfjord on west coast, pop. 13,456. Built of wood. Cotton mill, pulp mills, foundries, &c. Accessible to vessels drawing 25 ft. Wharfs with 20 ft. water alongside. Harbour kept open by ice-breakers. Repair shops. Exports, wood, pulp, paper. Imports, coal, salt, manure, grain, &c. Railways, to Strömstad and Göteborg (Appendix II, Route 62), to Vänersberg, &c. (Route 58), narrow gauge to Bengtsfors (Route 63). British vice-consul.

Umeå, port on Gulf of Bothnia, pop. 6,000. Capital of Västerbotten län, rebuilt since fire in 1888, lies 12 m. from mouth of Umeå. All large vessels anchor in Umeåfjord in 6–9 fms., where there are various quays in deep water at Storsandskär. In town harbour less than 10 ft. water; quay in same depth with railway lines. Small repairs. Closed by ice November to May. Exports timber, wood pulp, and tar. Railway to main line at Vännäs (Appendix II, Route 72).

Uppsala or **Upsala**, capital of Uppsala län, pop. 27,916. Old town, seat of archbishop of Sweden; university (founded 1477: 2,000 students). Chief buildings, university, library, cathedral, museums, observatory, hospital. Gamla Uppsala, $2\frac{1}{2}$ m. north, was early site of town. Railways to Stockholm, Enköping, and Sala (Appendix II, Route 72), to Gäfle (Route 74), narrow gauge to Norrtälje (Route 71). Water communication possible to Lake Mälaren (see p. 255).

Varberg, port on the Kattegat, pop. 7,100. Sea-bathing resort; granite quarries. Small artificial harbour, depth 13 ft. Wharves 1,000 yds. long in 13 ft. water. Small

repair shops. 6-ton crane. Exports, granite and timber Imports, coal, grain, &c. Railways to Göteborg and Hälsingborg (Appendix II, Route 45), to Borås (Route 53), to Kinnared (Route 52). British vice-consul.

Västerås, port on Lake Mälaren, pop. 24,403. Lies at mouth of Svarta at head of a gulf. Manufactures electrical appliances and machinery, aluminium goods. Railway to Stockholm and Frövi (Appendix II, Route 40).

Västervik or **Vestervik**, port in Kalmar län, pop. 11,184. Industries, shipbuilding and joinery. Anchorage in 5-7 fms. Long quays with railway lines in $6\frac{1}{2}$ - $7\frac{1}{4}$ ft. water. Patent slip 150 ft. long, 30 ft. wide, with lifting capacity of 500 tons. Generally open all winter. Repair shops. Narrow gauge railways to Linköping and Hultsfred (Appendix II, Route 31). British vice-consul.

Växjö or **Vexjö**, capital of Kronobergs län. Lies on Växjösjön, founded 1342, rebuilt 1843. Iron foundries and match factories. Railways to Alfresta and Karlskrona (Appendix II, Route 23), to Ronneby (Route 19), and narrow gauge to Åseda and Viserum (Route 26).

Visby, port and capital of Gotland, pop. 10,000. Ancient walled city with cathedral and other old churches; centre of Hanseatic League in middle ages. Now an agricultural centre with small shipbuilding yards and mechanical works. Anchorage in open roads in 24-27 fms. Small artificial harbour. 15-18 ft. water in outer harbour, $14\frac{3}{4}$ ft. in inner harbour. Old harbour filled up and laid out as gardens. Quays in 14-16 ft. water. 15-ton crane. Small patent slip for barges. Exports, grain, limestone, &c. Imports, coal, &c. Gotland railways. (Appendix II, Route 81). Steamers to Stockholm, Nynäshamn, and Västervik; and in summer to other Swedish ports. British vice-consul.

Ystad, port in S. of Skåne, pop. 12,077. Closely built town with flour, sugar and saw mills, foundries, shipbuilding, lime works, &c. Harbour artificial, with depths of 13-22 ft. Wharfage 1,300 yds. in 11-21 ft. water; railway sidings. Harbour being extended and new quays added. Sometimes

obstructed by ice in February. Patent slip, 175 ft. long, 27 ft. wide, with lifting power of 400 tons. Repair shops. Exports, fish, grain, live-stock. Imports, coal, grain, salt, &c. Railways to Trälleborg (Appendix II, Route 4), to Köpingebro (Route 11). Steamers to Lübeck, Bornholm, Copenhagen, &c. British vice-consul.

APPENDIX II

RAILWAY ITINERARIES

SUMMARY

SWEDISH RAILWAYS

(Including lines from Kristiania into Sweden, Routes 64, 65. For connexions between Sweden and Norway see also Routes 82 and 85.)

ROUTE NO.	PAGE
1. Malmö-Nässjö-Linköping-Stockholm	297
<i>Branches: Lund-Bjärred; Lund-Harlösa; Nässjö-Falköping; Mjölby-Hästholmen; Åby-Katrineholm; Älfsjö-Nynäshamn.</i>	
2. Malmö-Billesholm-Ängelholm	302
<i>Branches: Käflinge-Barsebäckhamn; Åstorp-Mölle.</i>	
3. Malmö-Staffanstorp-Veberöd-Simrishamn	303
<i>Branches: Dalby-Bjärsjölagård.</i>	
4. Malmö-Trälleborg-Ystad	305
<i>Branch: Vällinge-Falsterbo.</i>	
5. Malmö-Rydsgård-Ystad	306
<i>Branch: Börringe-Östratorp.</i>	
6. Malmö-Trälleborg	306
7. Malmö-Klågerup-Genarp	307
8. Malmö-Limhamn	307
9. Trälleborg-Lund	308
10. Landskrona-Sjöbo	308
<i>Branch: Käflinge-Lund.</i>	
11. Ystad-Tomelilla-Eslöf	309
12. Tomelilla-Långebro	310
13. Ystad-Gärsnäs-St. Olof	310
14. Åhus-Eslöf	311
<i>Branches: Tollarp-Kristianstad; Hörby-Hör.</i>	
15. Åhus-Kristianstad	312
16. Kristianstad-Hässelholm	312
17. Kristianstad-Hästveda	312
18. Kristianstad-Älmhult	313

ROUTE NO.	PAGE
19. Karlskrona-Kristianstad (narrow)	313
<i>Branches</i> : Bredåkra-Växjö; Sandbäck-Olofström; Sölvesborg-Listershufvud (all narrow).	
20. Sölvesborg-Älmhult	315
21. Karlshamn-Vislanda (narrow)	316
<i>Branch</i> : Norraryd-Kvarnamåla (narrow).	
22. Nätrabyhamn-Ingelstad (narrow)	316
23. Karlskrona-Alfvesta	317
<i>Branch</i> : Lessebo-Målerås (narrow).	
24. Karlskrona-Kalmar (narrow)	318
25. Kalmar-Nässjö	319
<i>Branch</i> : Nybro-Emmaboda.	
26. Växjö-Visserum (narrow)	320
27. Kalmar-Berga (narrow)	321
<i>Branches</i> : Sandbäckshult-Fagerhult; Ruda-Oskarshamn (both narrow).	
28. Oskarshamn-Nässjö	322
29. Målilla-Säfsjö (narrow)	323
30. Hultsfred-Linköping	323
31. Västervik-Norsholm (narrow)	324
<i>Branches</i> : Jenny-Hultsfred; Ringstorp-Linköping (both narrow).	
32. Valdemarsvik-Norrköping (narrow)	326
<i>Branch</i> : Kummelby-Arkösund (narrow).	
33. Norrköping-Örebro (narrow)	327
34. Oxelösund-Eskilstuna	327
35. Södertälje-Eskilstuna-Kolbäck	328
<i>Branches</i> : Akers Styckebruck-Strängnäs; Hällby Brunn-Mälarbaden; Rekarne-Valskog.	
36. Linköping-Ödeshög (narrow)	329
<i>Branch</i> : Skänninge-Väderstad (narrow).	
37. Mjölby-Hallsberg-Krylbo	330
38. Ervalla-Otterbäcken	332
<i>Branches</i> : Gytorp-Bredsjö; Kortfors-Grythytted.	
39. Frövi-Ludvika	334
40. Stockholm-Tillberga-Frövi	335
<i>Branches</i> : Kolbäck-Ramnäs; Köping-Riddarhyttan (narrow).	
41. Tillberga-Ludvika-Vansbro	337
<i>Branch</i> : Ängelsberg-Krylbo.	
42. Landskrona-Billesholm	339
43. Hälsingborg-Eslöf	339
<i>Branch</i> : Billeberga-Landskrona.	
44. Hälsingborg-Hässelholm	340

ROUTE NO.	PAGE
45. Hälsingborg-Göteborg	341
46. Ängelholm-Eslöf	343
47. Veinge-Hässleholm	343
48. Halmstad-Vislanda (narrow)	344
49. Halmstad-Värnamo	345
50. Landeryd-Falköping	345
<i>Branch: Åsarp-Tidaholm.</i>	
51. Falkenberg-Limmared (narrow)	346
52. Varberg-Kinnared	347
53. Varberg-Herrljunga	348
54. Åstorp-Jönköping	348
<i>Branch: Vaggeryd-Nässjö.</i>	
55. Jönköping-Vireda (narrow)	350
56. Göteborg-Särö	350
57. Göteborg-Borås-Alfvesta	351
<i>Branch: Hillared-Axelfors.</i>	
58. Göteborg-Laxå-Hallsberg-Katrineholm-Järna, for Stockholm	352
<i>Branches: Herrljunga-Uddevalla; Sköfde-Karlsborg;</i>	
<i>Skebokvarn-Stålboga.</i>	
59. Göteborg-Lidköping-Mariestad-Gårdsjö (narrow)	356
<i>Branches: Nossebro-Trollhättan; Lidköping-Tun; Marie-</i>	
<i>stad-Moholm (all narrow).</i>	
60. Tumleborg-Skara-Sköfde (narrow)	357
<i>Branches: Skara-Lidköping; Skara-Forshem; Skara-</i>	
<i>Timmersdala; Axvall-Hjo (all narrow).</i>	
61. Göteborg-Falun-Storvik	359
<i>Branches: Alfhem-Lilla Edet; Kil-Torsby; Hörken-Neva</i>	
<i>(narrow); Falun-Björbo; Falun-Mora.</i>	
62. Strömstad-Göteborg	364
63. Uddevalla-Bengtsfors (narrow)	365
64. Kristiania-Fredrikskald-Mellerud	366
<i>Branch: Ski-Sarpsborg.</i>	
65. Kristiania-Karlstad-Laxå	368
<i>Branch: Svarta-Örebro.</i>	
66. Karlstad-Filipstad (narrow)	371
67. Kristinehamn-Mora	372
<i>Branches: Nyhyttan-Finshyttan; Brintbodarne-Limeds-</i>	
<i>forsen; Mora-Älfdalen.</i>	
68. Mora-Bollnäs	374
<i>Branches: Orsa-Sveg; Voxna-Lobonäs</i>	
69. Stockholm-Saltsjöbaden	375
70. Stockholm-Hallstavik (narrow)	376
<i>Branches: Ösby-Djursholm; Näsby-Österskär (both</i>	
<i>narrow).</i>	

ROUTE NO.	PAGE
71. Norrtälge-Uppsala (narrow)	377
72. Stockholm-Haparanda	378
<i>Branches: Uppsala-Enköping; Fors-Grufgården; Byvalla-Långshyttan; Kilafor-Stugsund; Ange-Sundsvall; Mellandsel-Örnsköldsvik; Vännäs-Umeå; Bastuträsk-Skellefteå-Kallholmen; Älfsby-Piteå; Boden-Luleå; Karungi-Öfver Torneå.</i>	
73. Krylbo-Rättvik	386
74. Gäfle-Uppsala	387
<i>Branch: Dannemora-Hargshamn (narrow).</i>	
75. Gäfle-Sala-Tillberga	388
<i>Branches: Hagaström-Storvik; Runhällen-Enköping.</i>	
76. Gäfle-Ockelbo	390
77. Norrsundet-Linghed (narrow)	390
<i>Branch: Vintjärn-Hinsen (narrow).</i>	
78. Hudiksvall-Ljusdal	391
79. Hudiksvall-Bergsjö (narrow)	391
80. Oland Railways	392
81. Gotland Railways	393

NORWEGIAN RAILWAYS

(For lines from Kristiania into Sweden see Routes 64, 65)

82. Trondhjem-Bräcke (Sweden)	394
83. Östersund-Dorotea (Swedish)	396
84. Härnösand-Långsele (Swedish)	397
85. Narvik-Boden (Sweden)	398
<i>Branch: Gällivåra-Porjus (Swedish)</i>	
86. Thamshavn-Lökken (narrow)	400
87. Hell-Sunnan	400
88. Trondhjem-Kristiania (partly narrow)	402
89. Elverum-Kongsvinger	405
90. Hamar-Dombaas	406
91. Sörumsand-Skullerud (narrow)	407
92. Bergen-Kristiania	408
<i>Branch: Nestum-Os.</i>	
93. Roa-Gjøvik	411
<i>Branches: Eina-Fagernes; Reinsvold-Skreia.</i>	
94. Kristiania-Drammen-Skien (narrow)	413
<i>Branch: Eidanger-Brevik (narrow)</i>	
95. Drammen-Hougsund-Randsfjord	416
<i>Branches: Hougsund-Kongsberg; Vikesund-Kröderen</i>	
96. Holmestrand-Vittingfos (narrow)	417
97. Tönsberg-Eidsfos (narrow)	417

ROUTE NO.	PAGE
98 Arendal—Tveitsund (narrow)	418
<i>Branch : Rise—Grimstad (narrow).</i>	
99. Lillesand—Flaksvand (narrow)	419
100. Kristiansand—Byglandsfjord (narrow)	419
101. Stavanger—Flekkefjord (narrow)	420

NOTE

All lines are standard gauge unless otherwise stated.

ROUTE 1

MALMÖ—NÄSSJÖ—LINKÖPING—STOCKHOLM, 373 miles

Double line to Hässleholm, whence single to Rönninge, and thence double to Stockholm.

miles

0	Malmö. Line skirts the Sound for 2 miles and then turns NE.
3	Arlöf. Sugar refinery. Line to Ängelholm branches ; see Route 2.
5½	Åkarp.
7¼	Uppåkra.
10¼	Lund. For line from Trälleborg, see Route 9 ; for line from Landskrona and Käflinge, see Route 10.
	Branch W. to Bjärred :—3½ m. <i>Fjälje</i> . 5 m. <i>Leråkra</i> . 5½ m. <i>Flädie</i> . (Line from Malmö to Ängelholm crosses ; see Route 2.) 6¼ m. <i>Bjärred</i> , sea-bathing resort on the Sound.
	Branch E. to Harlösa :—½ m. <i>Lund</i> , South station. 4¼ m. <i>Hardeberga</i> . 7 m. <i>Sandby</i> . 12 m. <i>Refvinge</i> . 13¼ m. <i>Refvinge</i> . Leaving station, line crosses the Käflingeå, 14½ m. <i>Harlösa</i> . (For line from Landskrona to Sjöbö, see Route 10, and from Malmö, see Route 3.)
13¼	Stångby. Leaving station, line crosses the Käflingeå.
15¼	Örtofta , at confluence of the Bråå with the Käflingeå. For line from Landskrona to Sjöbö, see Route 10.

miles	
18½	Line crosses the Bråå.
20½	Eslöf. Important railway junction. For line from Hälsingborg and Landskrona, see Route 43 ; for line from Ängelholm and Klippan, see Route 46 ; for line from Ystad, see Route 11 ; for line from Åhus, see Route 14.
26½	<i>Stehag</i> , alt. 192 ft. Line passing N. end of Ringsjön.
33	Hör , alt. 232 ft. Quarries. For branch SE. from Hörby, see Route 14, under mile 29½.
38½	<i>Tjörnarps</i> .
41½	<i>Sösådala</i> .
51	Hässleholm , alt. 150 ft. Double line ends. For line from Kristianstad and Åhus, see Route 16 ; for line from Hälsingborg, see Route 44 ; and for line from Veinge and Markaryd, see Route 47.
55½	Line crosses the Almaå.
56½	<i>Balingslöf</i> . Many small lakes from here onwards.
63	Hästveda , alt. 197 ft. For line from Kristianstad, see Route 17.
69¾	<i>Osby</i> , at end of Osbysjön.
78	Killeberg .
81	Line from Kristianstad (see Route 18) joins.
83½	Almhult , alt. 489 ft. For line from Sölvesborg, see Route 20.
86	<i>Möckeln</i> , on Möckelnsjön, which the line skirts.
90½	<i>Dio</i> , on Möckelnsjön.
93½	<i>Liatorp</i> .
104½	Vislanda , alt. 506 ft. For line from Karlshamn, see Route 21 ; and for line from Halmstad, see Route 48.
113	Alfvesta , alt. 498 ft., at N. end of Lake Salen. For line from Karlskrona, see Route 23. For line from Göteborg, see Route 57.
116½	<i>Gäfvetorp</i> , alt. 504 ft., on Dansjön.
120½	<i>Moheda</i> .
124½	<i>Lidnäs</i> , on Lake Stråken. Line rises.

miles

- 132½ *Lamhult*, alt. 687 ft. Line continues among many lakes.
- 142½ *Stockaryd*, alt. 749 ft. Line crosses vast peat bogs.
- 149 *Säfsjö*, alt. 754 ft. For line from Målilla, see Route 29.
- 156 *Sandsjö*, alt. 944 ft. Line skirts Storsjön.
- 159½ *Grimstorp*.
- 166½ *Nässjö*, alt. 961 ft., highest point on railway. For line from Åstorp and Värnamo, see Route 54. For line from Oskarshamn, see Route 28. For line from Kalmar, see Route
- | | |
|-------|---|
| miles | |
| 0 | <i>Nässjö</i> . Line rises. |
| 10 | <i>Forserum</i> . |
| 16½ | <i>Tenhult</i> , alt. 728 ft.; summit after skirting Tenhultsjön. Line descends steeply. |
| 26½ | <i>Jönköping</i> , alt. 299 ft., at south end of Lake Vättern. Station by wharfs. Barracks.
For line from Åstorp and Värnamo, see Route 54, and for narrow gauge line to Vireda, see Route 55.
Line skirts high bank of Lake Vättern and leaves lake to |
| 33½ | <i>Bankeryd</i> , alt. 387 ft. |
| 38½ | <i>Habo</i> . |
| 46½ | <i>Mullsjö</i> , alt. 755 ft. Line crosses Lake Stråken. |
| 53½ | <i>Sandhem</i> . |
| 57½ | <i>Kättilstorp</i> . |
| 62½ | <i>Vartofta</i> , alt. 945 ft. For line from Limmared Landeryd to Tidaholm, see Route 50. |
| 68½ | <i>Falköping-Stad</i> , alt. 722 ft. For line to Åsarp, see Route 50. |
| 69½ | <i>Falköping-Ranten</i> ; junction for Göteborg-Stockholm line, see Route 58. |
| 173½ | <i>Solberga</i> . Line descending through wooded country. |
| 177½ | <i>Flisby</i> . |
| 181½ | <i>Aneby</i> , alt. 692 ft. Line passes north end of Lake Ralången. |
| 188½ | <i>Frinnaryd</i> , one mile after crossing the Svartå. Line ascends valley. |

miles

- 192½ *Gripenberg*. Line crosses the Svartå, and north end of Säbysjön.
- 198¾ *Tranås*, alt. 515 ft., on the Svartå. Line runs near Lake Sommen to—
- 206½ *Sommen*, alt. 480 ft., at north end of lake.
- 211¾ *Boxholm*, alt. 466 ft., after crossing the Svartå. Iron works.
- 214¾ *Strålsnäs*. Line follows the Svartå valley.
- 221½ *Mjölby*, alt. 381 ft.; flour mills. For line to Hallsberg and Krylbo, see Route 37.
- Branch W. to Hästholmen :—4¼ m. *Högstad*, alt. 367 ft. 8½ m. *Väderstad*, alt. 360 ft. (For narrow-gauge line from Skänninge, see Route 36.) 11½ m. *Seankals*. 13½ m. *Rök*, alt. 360 ft. 16½ m. *Hedaslätt*, alt. 360 ft. 19 m. *Hästholmen*, alt. 282 ft. 19½ m. *Hästholmenhamn*. (For narrow-gauge line from Linköping and Vadstena to Ödeshög, see Route 36.)
- 225½ *Sya*. Line leaves the Svartå valley and descends.
- 227¾ *Mankop*.
- 234¼ *Bankeberg*.
- 237¼ *Malmslätt*.
- 241½ *Linköping*, alt. 131 ft. For line from Hultsfred, see Route 30; to Lake Vättern, see Route 36. Leaving Linköping line crosses the Stångå.
- 248¼ *Linghem*, alt. 180 ft.
- 252½ *Gistad*.
- 256¼ *Norsholm*, alt. 118 ft., just after crossing the Göta Canal (p. 249), on the Motalaström. For narrow-gauge lines from Västervik, see Route 31.
- 258¾ *Kimstad*, on the Motalaström. Narrow-gauge line from Norrköping to Örebro crosses, see Route 33.
- 261¾ *Okna*, alt. 69 ft., near Lake Glan.
- 264¾ *Eksund*, on the Motalaström, which line crosses to
- 266½ *Fiskeby*. Line sweeps round to
- 270¼ *Norrköping*. Line turns N. five miles from mouth of the Motalaström: seaport. For narrow-gauge line W. to Örebro, see Route 33. For narrow-

miles

gauge lines from Arkösund and Valdemarsvik, see Route 32.

275½

Åby. Line turns E.

miles

- | | |
|-----|---|
| | Branch N. to Katrineholm :— |
| 0 | <i>Åby.</i> Line runs N. and traverses wooded hills of Kolmården, and ascends. |
| 1½ | <i>Grafversfors</i> , after short tunnel. Line runs along narrow Lake Näcken, crossing it in places on embankments. |
| 9½ | <i>Simonstorp</i> , after another tunnel. Line passes Flätensjön, alt. 204 ft., to |
| 17½ | <i>Strångsjö</i> . Country much diversified by lakes. |
| 24½ | <i>Katrineholm</i> . |
| | For line from Göteborg, see Route 58. |

282½

Krokek. Line leaves sea.

286½

Lofbråten. Narrow-gauge line crosses from Virå (marble quarries) to Kolmården (Sandviken), 9½ miles.

292

Ålberga.

297½

Jönåker.

302½

Enstaberga.

307½

Nyköping. Station NW. of town. For line from Oxelösund to Nyköping and Eskilstuna, see Route 34.

311½

Sjösa.

319½

Tystberga.

323

Lästringe.

328½

Västerljung.

331

Vagnhärad.

337½

Hölö.

341½

Line from Göteborg and Katrineholm joins ; see Route 58.

342½

Järna, alt. 119 ft. Tunnel.

346½

Line crosses Lake Lanaren and then traverses a tunnel.

347½

Line to Eskilstuna branches to W. ; see Route 35.

349½

Saltskog. Leaving station, line crosses Södertälje (Göta) canal by high swing-bridge.

Branch N. to Södertälje, on a gulf of Lake Mälaren, ½ mile.

miles

355½

Rönninge. Double line to Stockholm.

359

Tumba. Paper mill of Bank of Sweden. Line passes end of Tullingesjön.

364½

Huddinge.

368½

Alfsjö.

Branch S. to Nynäshamn :—4½ m. *Södertörn*. 10½ m. *Handen*. 14½ m. *Västerhaninge*. 16½ m. *Tungelsta*. 19½ m. *Hemfosa*. 23½ m. *Sorunda*. 26½ m. *Ösmo*. 29½ m. *Valsjö*. 32 m. *Kullsta*. Line curves back N. to 33½ m. *Nynäshamn*, sea-bathing resort.

370¾

Liljeholmen, after tunnel 300 yds. long. Railway workshops. Line crosses Årstaviken on embankment 240 yds. long.

372

Stockholm, South station. Then tunnel 800 yds. long, and line crosses an arm of Lake Mälaren on a long bridge, traverses Riddarholmen and crosses a second arm of Mälaren on an embankment.

373

Stockholm, Central station.

ROUTE 2

MALMÖ—BILLESOLM—ÄNGELHOLM, 51 miles

0

Malmö. Line skirts coast. 3 m. *Arlöf*. Line for Lund and Stockholm branches, see Route 1. 5¾ m. *Lomma*. Line near coast. 8¼ m. *Önnerup*. Line leaving coast. 9½ m. *Flädie*. Line from Lund to Bjärred passes over; loop line joins. 12 m. *Stäfvie*. 13½ m. *Furulund*.

15

Käfflinge. For line from Landskrona to Lund and to Sjöbö see Route 10.

Branch E. to Barsebäckhamn :—1¼ m. *Tungan*. 2¾ m. *Höjsmölla*. Line runs near the Löddeå. 4½ m. *Västanhöj*. 6 m. *Löddeköpinge* on the Löddeå. Line leaves river. 7¼ m. *Barsebäcksby*. 8½ m. *Sjöbobadet*. 9¾ m. *Barsebäckhamn* on coast; no harbour.

miles

- 17 m. *Södervidinge*. 18½ m. *Norrvidinge*.
 20½ **Teckomatorp**. For line from Hälsingborg to Eslöf,
 see Route 43.
 23½ m. *Svalöf*. 26 m. *Källstorp*. 27½ m. *Axel-*
vold. 30 m. *Kågeröd*. 32½ m. *Böketofta*.
 36½ **Billesholm**. For line from Landskrona, see Route 42.
 Branch NW. to Bjuf and Hylinge:—3 m. *Bjuf* (for Hälsingborg-
Åstorp line, see Route 44). 6½ m. *Hylinge*, alt. 39 ft.
 36½ *Billesholms Grufva*.
 38½ *Norra Vram*.
 42½ **Åstorp**, alt. 91 ft.
 For Hälsingborg-Hässleholm line, see Route 44.
 For line to Markaryd and Jönköping, see Route 54.
 Branch W. to Höganäs and Mölle:—4½ m. Crosses the *Vegeå*.
 5½ m. *Hasslarp*. 7 m. *Kattarp*. (For Hälsingborg-Göteborg
 line, see Route 45.) 8½ m. *Västraby*. 9½ m. *Stureholm*.
 11½ m. *Mjöhult*. 13 m. *Ingelströde*. 16 m. *Höganäs Öfvere*.
 17½ m. *Höganäs Nedre*, pop. 5,200; seaport. Coal mines.
 Line continues N. along coast. 19 m. *Strandbaden*. 20½ m.
Nyhamnsläge. 21½ m. *Krapperup*. 24 m. *Mölle*, fishing
 port; bathing resort.
 46½ *Spannarp*.
 51 **Ängelholm**.
 For line from Hälsingborg to Göteborg, see Route
 45; for line to Klippan and Eslöf, see Route 46.

ROUTE 3

MALMÖ—STAFFANSTORP—VEBERÖD—SIMRISHAMN,

59½ miles

- 0 **Malmö**.
 1½ *Östervärn*.
 For line to Genarp and Ystad, see Route 7.
 For line to Trälleborg, see Route 6.

miles

4 m. *Sege*. 5½ m. *Nordanå*. Line runs near the
Segeå to 7¼ m. *Djurslöf*.

9¾

Staffanstorp.

For line from Trälleborg to Lund, see Route 9.

12

Kyrkheddinge. In ½ mile line crosses the Höjeå.

15½

Dalby, alt. 512 ft.

miles

Branch NE. to Harlösa and Bjärsjölagård :—

0

Dalby. Line ascends.

3

Hällestad. Line descends.

5½

Sulfåkra, alt. 95 ft. Leaving station, line passes
Krankesjön.

8½

Harlösa, alt. 103 ft. For line from Landskrona to
Sjöbo, see Route 10; and for line from Lund, see
Route 1.

11

Skartofta.

14¼

Bjärsjölagård, alt. 352 ft. Junction of line from
Ystad to Eslöf, see Route 11.18½ m. *Björnstorp*. 22¼ m. *Veberöd*, alt. 574 ft.26¼ m. *Klostersågen*.

30½

Sjöbo.

For line from Landskrona, see Route 10.

33½ m. *Söfdeborg*. 35¾ m. *Eriksdal*. 38¾ m.*Högestad*.

42¾

Tomelilla.

For line from Ystad to Eslöf, see Route 11.

For line to Långebro, see Route 12.

46½

Lunnarp. 49½ m. *Smedstorp*.

52

Gärnsås.

For line from Ystad to St. Olof, see Route 13.

54¼

Tommarp. 56½ m. *Järrestad*.

59½

Simrishamn, small seaport.

ROUTE 4

MALMÖ—TRÄLLEBORG—YSTAD, 50½ miles

miles

0 **Malmö.**2¼ *Södervärn.* Alternative route branches to SE., see

Route 6.

3½ *Kulladal.* 5¼ m. *Vintrie.* 7 m. *Klagstorp.*8¼ **Tygelsjö,** alt. 88 ft.Branch W. to *Klagshamn* on coast (pier), 3 miles.9¾ *Hököpinge.*11½ **Vällinge.**

Branch SW. to Falsterbo:—1½ m. *Akeshög.* 2¾ m. *Kungstorp.*
 4 m. *Fotevik.* 6½ m. *Ljunghusen*, on Höllviken, which line
 skirts. 9½ m. *Skånör.* 11 m. *Falsterbo*, both sea-bathing
 resorts.

14 *Håslöf.* 16¾ m. *Skegrie*, alt. 16 ft. 17¾ m.*Skytts-Tommarp.*20½ **Trälleborg.** Junction of direct line from Malmö,
see Route 6.

For line from Trälleborg to Lund, see Route 9.

24¼ *Gislöf.* Line leaves sea. 25½ m. *Simlinge.* 27 m.
Åby. 28 m. *Vallby.*29½ **Klagstorp,** alt. 92 ft. Junction of line from
Böringe to Östratorp, see Route 5.32 *Bedinge.* 35½ m. *Tofthög*, alt. 52 ft.37¾ **Skifvarp.** Junction of line from Rydsgård, see
Route 5. Leaving line crosses the Skifvarpså.40 **Nöbbelöf.** 41½ m. *Sjörup.* 43 m. *Snårestad.*45½ **Charlottenlund.** Junction of direct line from
Malmö, see Route 5.50½ **Ystad.**For lines to Eslöf, see Route 11, and to St. Olof,
see Routes 11 and 13.

ROUTE 5

MALMÖ—RYDSGÅRD—YSTAD, 39 miles

miles

0	Malmö.
2½	<i>Södervärn.</i> Alternative route branches to S., see Route 4.
3½	Line from Malmö to Trälleborg crosses, see Route 6.
4	<i>Hindby.</i>
6½	Oxie , alt. 131 ft. Branch SE. to Bönnarp, 4 miles.
10½	<i>Skabersjö.</i>
13½	<i>Svedala</i> , alt. 155 ft. Line from Trälleborg to Lund crosses, see Route 9.
17½	Böringe , alt. 168 ft., after crossing end of Böringesjön. Branches to Östratorp:—1½ m. <i>Hafgård</i> . 3¼ m. <i>Stäfvessjö</i> , alt. 138 ft. 4½ m. <i>Anderslöf</i> . 6½ m. <i>Hönsinge</i> . 8½ m. <i>Jordborga</i> . 10 m. <i>Klagstorp</i> , alt. 97 ft. Line from Trälleborg to Ystad crosses, see Route 4. 11½ m. <i>Åspö</i> , alt. 54 ft. 13½ m. <i>Östratorp</i> , fishing port.
21	<i>Näsbyholm</i> , alt. 146 ft. 24 m. <i>Skurup</i> , alt. 165 ft.
27½	Rydsgård. Leaving line crosses the Skifvarpså. Branch S. to Skifvarp:—1½ m. <i>Tånebro</i> . 4½ m. <i>Skifvarp</i> . For line from Trälleborg to Ystad, see Route 4.
	30½ m. <i>Rynge</i> . 31½ m. <i>Marsvinsholm</i> .
34	Charlottenlund. Line from Trälleborg joins, see Route 4.
39	Ystad. For lines to Eslöf, see Route 11.

ROUTE 6

MALMÖ—TRÄLLEBORG, 19 miles (Express route)

0	Malmö.
1½	<i>Östervärn.</i> For line to Staffanstorp and Simrishamn, see Route 3.

miles

- For line to Genarp, see Route 7.
- 3 $\frac{1}{4}$ Line from Malmö to Ystad crosses, see Route 5.
- 4 $\frac{1}{2}$ *Fosieby*. 6 $\frac{1}{4}$ m. *Lockarp*. 8 m. *Arrie*. 10 m.
Jordholmen. 12 m. *Östra Grefvie*. 13 $\frac{1}{2}$ m. *Slågarp*.
 16 m. *Vemme löf*. Line takes a sweep and from the
 east reaches
- 19 **Trälleborg**. For alternative line from Malmö and
 line to Ystad, see Route 4; for line to Lund, see
 Route 9.

ROUTE 7

MALMÖ—KLÅGERUP—GENARP, 17 $\frac{1}{2}$ miles

- 0 **Malmö**.
- 1 $\frac{1}{2}$ *Östervärn*. For line to Staffanstorp see Route 3,
 and to Trälleborg, see Route 6.
- 3 $\frac{1}{4}$ 3 $\frac{1}{4}$ m. *Hohög*. 4 $\frac{1}{2}$ m. *Kvarnby*, alt. 180 ft. 7 m.
Bjäres ög after crossing the Segeå. 8 $\frac{3}{4}$ m. *Bara*.
- 9 $\frac{1}{4}$ Branch S. to *Bokskogen Öfvre*, $\frac{1}{2}$ mile.
- 11 $\frac{3}{4}$ **Klågerup**, alt. 172 ft. For line from Trälleborg to
 Lund, see Route 9.
- 14 *Kongsmarken*, alt. 166 ft. 16 $\frac{1}{2}$ m. *Toppeladugård*,
 alt. 394 ft.
- 17 $\frac{1}{2}$ **Genarp**. Line under construction to Ystad.

ROUTE 8

MALMÖ—LIMHAMN, 2 $\frac{3}{4}$ miles

- 0 **Malmö**, station on W. of harbour.
- 2 $\frac{3}{4}$ *Limhamn*, on coast; limestone quarries and fac-
 tories.

ROUTE 9

TRÄLLEBORG—LUND, 26 miles

miles	
0	Trälleborg.
4 $\frac{1}{4}$	<i>Fjärdingslöf</i> , alt. 90 ft.. 6 $\frac{3}{4}$ m. <i>Alstad</i> , alt. 158 ft. 8 $\frac{1}{4}$ m. <i>Marieberg</i> .
11	Svedala , alt. 155 ft. Junction for Malmö–Ystad line, see Route 5.
14	<i>Bökebergsslätt</i> , halt. Line skirts Lake Yddingen. 15 $\frac{1}{2}$ m. <i>Holmeja</i> .
18 $\frac{1}{2}$	Klägerup . For line from Malmö to Genarp, see Route 7.
21 $\frac{1}{2}$	Staffanstorp . For line from Malmö to Harlösa and Sjöbo, see Route 3.
26	Lund . For Malmö–Stockholm line and lines to Harlösa and Bjärred, see Route 1; for line from Landskrona, see Route 10.

ROUTE 10.

LANDSKRONA—SJÖBO, 41 miles

0	Landskrona.
3	<i>Häljarp</i> . Line follows the Saxå. 6 m. <i>Saxtorp</i> . 7 $\frac{1}{4}$ m. <i>Annelöf</i> . 9 m. <i>Dösjebro</i> , after crossing the Saxå. 10 $\frac{1}{2}$ m. <i>Dagstorp</i> .
13	Käfinge . Line follows the Löddeå. For Malmö, Ängelholm, and line to Barsebäckhamn, see Route 2. Branch SE. to Lund:— <i>Käfinge</i> . Line crosses the Löddeå with Malmö line. 1 $\frac{1}{4}$ m. <i>Lackalänga</i> . 4 m. <i>Vallkärra</i> . 7 $\frac{1}{2}$ m. <i>Lund</i> . (For Malmö–Stockholm line and lines to Harlösa and Bjärred, see Route 1. For line from Trälleborg, see Route 9.)
14 $\frac{1}{4}$	<i>Rinnebäck</i> . 15 $\frac{3}{4}$ m. <i>Krutmöllan</i> . 17 m. <i>Harrie</i> . Line crosses the Löddeå to
18 $\frac{3}{4}$	Ortofta . For Malmö–Stockholm line, see Route 1.

miles

- 20½ m. *Hviderup*. Line ascends Käflingeå valley.
 23¾ m. *Gårdstånga*, alt. 70 ft. 24¼ m. *Flyinge*.
 26½ m. *Holmby*. 29½ m. *Hunneberga*.
 31¾ **Harlösa**, alt. 103 ft. For line from Lund, see
 Route 1, and line from Malmö, Route 3.
 34¼ *Täpperöd*, alt. 73 ft., on Vombsjön, which line
 skirts.
 36¾ *Öved*. Branch to E., 2½ miles.
 41 **Sjöbo**.
 For line from Malmö to Simrishamn, see Route 3.

ROUTE 11

YSTAD—TOMELILLA—ESLÖF, 47½ miles

- 0 **Ystad**.
 5 *Köpingebro*.
 5½ Line crosses the Nyloå and branches. For line to
 Gärnsås and St. Olof, see Route 13.
 7¼ *Svenstorp*, alt. 37 ft. Line crosses the Nyloå
 several times to
 12¼ **Tomelilla**. For Malmö—Simrishamn line, see Route
 3. For line to Långebro, see Route 12.
 17½ *Äsperöd*. 21 m. *Löfvestad*, alt. 248 ft. 24 m.
Klasaröd. 26½ m. *Vollsjö*, alt. 266 ft. Leaving line
 crosses river.
 30¼ **Bjärsjölagård**, alt. 350 ft. For line from Malmö
 and Dalby, see Route 3.
 34¼ *Askeröd*. 38¼ m. *Löberöd*, alt. 438 ft. 41¼ m.
Hurfva, alt. 360 ft. 44¼ m. Line crosses the Bråå.
 45 m. *Skarhult*, alt. 170 ft.
 47½ **Eslöf**. For line Malmö to Stockholm, see Route 1;
 for line from Ängelholm and Klippan, see Route 46;
 for line from Åhus, see Route 14; for line from
 Landskrona and Hälsingborg, see Route 43.

ROUTE 12

TOMELILLA—LÅNGBRO, 42 miles

miles

0

Tomelilla.4 m. *Spjutstorp*, alt. 277 ft. 5½ m. *Onslunda*.

10

St. Olof, alt. 438 ft. For line from Ystad and Gärsnäs, see Route 13.13¾ m. *Hvitaby*, alt. 259 ft. 16¼ m. *Raflundabro*, alt. 164 ft. 18¾ m. *Brösarp* after crossing the *Värkeå*. 20½ m. Crosses river. 21½ m. *Maglehem*. 23¼ m. *Olseröd*. 28¼ m. *Degeberga*, alt. 95 ft. Line descends. 29½ m. *Vittsköfle*.

32½

Efveröd, alt. 58 ft., after crossing the *Lynghyå*. For line from Åhus, see Route 14.35½ m. *Gringelstad*. 36¾ m. *Gårds Köpinge*, after crossing the *Köpingeå*. 39¾ m. *Åsumtorp*. Line skirts *Helgesjön* to

42

Långebro, opposite *Kristianstad*. Road bridge over the *Helgeå*.

ROUTE 13

YSTAD—GÄRSNÄS—ST. OLAF, 31 miles

0

Ystad.

5

Köpingebro.

5½

Line crosses the *Nybroå* and branches. For line N. to Tomelilla and Eslöv, see Route 11.9¼ m. *Glemmingebro*, alt. 58 ft. 9½ m. Line crosses the *Kabusåå*. 11 m. *Hedvigsdal*. 12¾ m. *Löderup*. 15¾ m. *Borrby*. 19½ m. *Hammenhög*, alt. 172 ft.

23

Gärsnäs. For line from Malmö and Tomelilla to Simrishamn, see Route 3.

26

Gyllebo, alt. 222 ft.

31

St. Olof, alt. 438 ft. Junction with line Tomelilla to Långebro, see Route 12.

ROUTE 14

ÅHUS—ESLÖF, 44 miles

miles

0

Åhus.

3 m. *Ripa*, alt. 18 ft. $4\frac{1}{4}$ m. Line crosses the Helgeå. $5\frac{1}{2}$ m. *Mjö*. $8\frac{1}{2}$ m. *Lyngby*.

 $9\frac{1}{4}$

Efveröd, alt. 58 ft. For line from Tomelilla to Långebro, see Route 12.

14

$11\frac{1}{4}$ m. *Lyngsjö*. $12\frac{1}{4}$ m. *Öfra Vram*, alt. 107 ft.

Tollarp, alt. 126 ft.

Branch N. to Kristianstad:—5 m. *Ovesholm*. $7\frac{1}{4}$ m. *Skepparslöf*, alt. 50 ft.

From Skepparslöf, branch E. to Långebro:—1 m. *Skepparslöf Nedre* (branch NW. to *Öllsjön*, 1 m.). $3\frac{1}{2}$ m. *Långebro*. (For line from Efveröd, see Route 12.)

$8\frac{1}{2}$ m. *Öllsjön* (branch SE. to Skepparslöf Nedre, 1 m.).

10 m. *Karpalund*. (For line to Hässleholm, see Route 16; to Hästveda, see Route 17.) $12\frac{1}{2}$ m. *Kristianstad*.

17 m. *Sätaröd*. $20\frac{1}{4}$ m. *Linderöd*, alt. 153 ft. $24\frac{1}{2}$ m. *Satserup*. 27 m. *Åspinge*, alt. 121 ft.

 $29\frac{1}{2}$

Hörby, alt. 252 ft.

Branch NW. to Hör:— $1\frac{1}{4}$ m. *Fulltofta*. $4\frac{1}{4}$ m. *Ludvigsborg*. 8 m. *Hör*. (For Malmö-Stockholm line, see Route 1.)

$31\frac{1}{4}$ m. *Osbyholm*. Line runs near Ringsjön. $34\frac{1}{4}$ m. Line continues near the same lake to $36\frac{1}{4}$ m. *Snogeröd*. 39 m. *Kungshult*. $41\frac{1}{2}$ m. *Kastberga*.

44

Eslöf. For Malmö-Stockholm line, see Route 1; for line from Ystad and Tomelilla, see Route 11; from Klippan and Ängelholm, Route 46; from Hälsingborg and Landskrona, Route 43.

ROUTE 15

ÅHUS—KRISTIANSTAD, 10½ miles

miles

0

Åhus.

2½ m. *Horna*. 4 m. *Rinkaby*. Line approaches Helgesjön. 6¾ m. *Viby*, alt. 38 ft. Line skirts Helgesjön. 8 m. *Hammar*.

10½

Kristianstad. For line from Karlskrona and Sölvesborg, see Route 19; to Älmhult, Route 18; and from Tollarp and Karpalund, Route 14.

ROUTE 16

KRISTIANSTAD—HÄSSLEHOLM, 18½ miles

0

Kristianstad. Line crosses two branches of the Helgeå near their exit from Aralslöfsjön.

2¾

Karpalund. For line to Hästveda, see Route 17.

5¾ m. *Önnestad*. 8 m. *Fridhem*. 11 m. *Vinslöf*. 13¼ m. *Ignaberga*. 15 m. *Attarp*.

18½

Hässleholm, alt. 150 ft. For Malmö–Stockholm line, see Route 1; for line from Hälsingborg and Klippan, see Route 44; for line from Veinge and Markaryd, see Route 47.

ROUTE 17

KRISTIANSTAD—HÄSTVEDA, 26 miles

0

Kristianstad. Line crosses two branches of the Helgeå.

2¾

Karpalund. For line to Hässleholm, see Route 16.

4 m. *Vinnö*. 5¾ m. *Färlöf*. Branch NW. to *Strö*, 3 miles. 8 m. *Bjärlöf*. 12 m. *Hanaskog*, alt. 72 ft. 13 m. Line crosses the Almaå and ascends valley of the Helgeå. 14¾ m. *Vanås*. 19 m. *Brody*. 22 m. *Glimminge* on Helgeå, alt. 133 ft.

26

Hästveda, alt. 197 ft. For Malmö–Stockholm line, see Route 1.

ROUTE 18

KRISTIANSTAD—ÄLMHULT, 41 miles

miles

0

Kristianstad. Line ascends.

1½

Line from Sölvesborg joins, see Route 19.

2 m. *Rödaled*. 3¼ m. *Balsby*, on Råbelöfsjön which line skirts. 6¼ m. *Österslöf*. 8 m. *Flackarp* halt, alt. 41 ft. 8½ m. *Ekestad*. Line leaves lake. 9¾ m. *Gårro*. 11¾ m. *Arkelstorp*. 13 m. *Kaffatorp*. Line takes great curves to 15 m. *Immeln* at south end of Immelensjön. 18¾ m. *Hylta*, alt. 219 ft. Line approaches the Bifvarödså. 21¼ m. *Sibbhult*. 21¾ m. Line crosses the Bifvarödså. 24¾ m. *Glimåkra*, alt. 198 ft. Line rises. 27¾ m. *Östaröd*. 30¼ m. *Boalt*. 32¾ m. *Kräbbleboda*. 36¾ m. *Hultaberg*, alt. 501 ft. 38½ m. *Loshult*. 39 m. Line joins Malmö—Stockholm line, see Route 1.

41

Älmhult, alt. 489 ft. For line from Sölvesborg, see Route 20.

ROUTE 19

KARLSKRONA—KRISTIANSTAD (narrow gauge: 1.067 metre),
82 miles

0

Karlskrona. Line runs alongside Karlskrona—Alfvesta line.

2½

Gullberna.

For line to Kalmar see Route 24.

4½

Rosenholm halt at head of Dannemarksfjord. Line crosses the Silleå before

7½

Nättraby. On leaving line crosses the Nättrabyå.Branch S. to *Nättrabyhamn*, 1¼ m.

For line to Växjö, see Route 22.

miles

12½ m. *Johannishus*. On leaving line crosses the Listerbyå. 14¾ m. *Edestad*.

18½ **Ronneby**, alt. 46 ft., on the Ronnebyå.

Branch to port at mouth of river (narrow gauge: 1·067 metre)
1¼ m. *Ronneby Brunn*. 2½ m. *Ronneby Redd*.

Line crosses the Ronnebyå on leaving town.

21 **Djupadal**, alt. 48 ft.

Branch E. to Kallinge on the Ronnebyå 1 mile.

22½ **Bredåkra**, alt. 165 ft.

Branch NW. to Växjö (narrow gauge: 1·067 metre):—3¾ m. *Ettebro*. 8 m. *Backaryd*, alt. 212 ft. 11¾ m. *Hallabro*. 18½ m. *Konga*. 21½ m. *Hensmåla* on Hensjön. 25¼ m. *Tingsryd* on Lake Tiken, alt. 438 ft. 30¼ m. *Kvarnamåla*, alt. 448 ft., on Fiskestadsjön, which line skirts. (For line from Norrmaryd, see Route 21.) 34 m. *Väckelsång*, alt. 530 ft. 36½ m. *Snappa-hem*. 37¾ m. *Uråsa*. 42¾ m. *Ingelstad (Ofver Torsås)* on Torsjön, alt. 516 ft. (For line from Nättraby, see Route 22.) 47¾ m. *Tegnaby*, alt. 537 ft. 51¼ m. Line from Emmaboda and Karlskrona (standard gauge) joins, see Route 23. 52¾ m. *Växjö*, alt. 535 ft. (For line to Alfveta, see Route 23; for line from Åseda, see Route 26.)

24¾ *Härsjön*. 26¼ m. Line skirts Härsjön for 1 mile. 29 m. *Hoby*, alt. 88 ft. 30 m. Crosses the Bräcknea. 31½ m. *Kullåkra*. 34 m. *Märserum*. 39½ m. *Trensum*.

43¾ **Karlshamn**, at mouth of the Miså.

For line to Vislanda (gauge 1·067 metre), see Route 21.

46¾ m. *Vekerum*. 49 m. *Mörrum*, after crossing the Morrumså. 51¾ m. *Gustafstorp*.

54½ **Sandbäck**.

Branch NW. to Olofström (narrow gauge: 1·067 metre):—3¾ m. *Grånum*. 6¼ m. *Jämsköp*. 9¼ m. *Holje*. 10¼ m. *Olofström*, after crossing the Holgeå. (For line from Sölvesborg to Älmhult, see Route 20.)

59½ *Gammalstorp*.

miles

63½

Sölvesborg. For standard-gauge line to Älmhult, see Route 20.

Branch E. to Listershufvud (narrow gauge: 1·067 metre):—1½ m. *Sölve.* 3¼ m. *Norremark.* 5 m. *Listershufvud.*

69

Bromölla after crossing the Skрабоå; branch N. to *Ifösjön* ½ mile.

71¼ m. *Gualöf* on *Ifösjön* which line skirts to 74¼ m. *Bäckaskog.* 76½ m. *Fjälkinge.* 80¼ m. *Nosaby.*

82½

Kristianstad on *Helgesjön.* For line to Älmhult see Route 18; for line to Hässleholm, see Route 16; for line from Åhus, see Route 15.

ROUTE 20

SOLVESBORG—ÄLMHULT, 44½ miles

0

Sölvesborg. Line skirts *Ifösjön.*

8¼ m. *Axeltorp.* 11½ m. *Näsum.* Line ascends the *Holjeå* valley. 14 m. *Östafors.* 15¾ m. *Jämsbögsby.*

18¾

Olofström. Line ascends the *Lånaå* valley. For narrow-gauge line from *Sandbäck*, see Route 19.

23¾ m. *Vilshult.* Line leaves valley. 28 m. *Esseboda* halt. 29¼ m. *Gylsboda.* 31¾ m. *Lönsboda.* 33 m. *Duvhult.* 35 m. *Kärraboda.* 38¼ m. *Hökön.*

44½

Älmhult, alt. 489 ft. For Malmö—Stockholm line see Route 1; for line from *Kristianstad*, see Route 18.

ROUTE 21

KARLSHAMN—VISLANDA (narrow gauge: 1·067 metre),
48 miles

miles

0

Karlshamn.

2½ m. *Asarum*. 4¼ m. *Gungvala*. 6¾ m. *Svängsta*, after crossing the Morrumså. 9¼ m. *Åkeholm*. Line ascends the Morrumså valley. 12¼ m. *Hemsjö*. Leaving line recrosses the Morrumså. 15¼ m. *Hovmansbygd*. 18¼ m. *Fridafors*. 22 m. *Ryd*. Line skirts Hönshyltefjord to

23½

Norrård on Hönshyltefjord.

Branch NE. to Kvarnamåla (narrow gauge: 1·067 metre):—5½ m. *Urshult* at south end of Lake Åsnen. 9 m. *Rösmåla*. 13 m. *Kvarnamåla*. (For Ronneby, Bredåkra, Växjö line, see Route 19.)

27 m. *Ålshult* at south end of Lake Åsnen. Line runs by islands, and natural embankment, and bridges to 32 m. *Ulvö* on Lake Åsnen which line skirts to 39½ m. *Torne* and 43¼ m. *Grimslöv*. Line leaves lake.

48

Vislanda, alt. 506 ft. For line from Halmstad, see Route 48; for Malmö—Stockholm line, see Route 1.

ROUTE 22

NÄTTRABYHAMN—INGELSTAD (narrow gauge: 0·6 metre),
52 miles

0

Nättrabyhamn. Line ascends the Nättraby valley.

½

Nättraby. For narrow-gauge line from Karlskrona to Kristianstad, see Route 19.

4¼ m. *Björkeryd*, alt. 88 ft., after crossing the Nättrabyå. 5½ m. Line recrosses the Nättrabyå. 8½ m. *Tving*, alt. 122 ft. 10¼ m. *Alnaryd*, alt. 130 ft.

miles

- From here onwards are many lakes. 13 $\frac{3}{4}$ m. *Bläningsmåla*. Line leaves the *Nättrabyå*. 15 $\frac{1}{2}$ m. *Svarthövdén*. 18 $\frac{1}{2}$ m. *Eringsboda*, alt. 384 ft. 23 $\frac{1}{2}$ m. *Yxnänäs*. 27 $\frac{1}{4}$ m. *Rävemåla*. 29 $\frac{3}{4}$ m. *Älmeboda*, alt. 487 ft. 36 $\frac{1}{2}$ m. *Linneryd*, alt. 454 ft. 45 $\frac{1}{2}$ m. *Nöbbele*. 47 $\frac{1}{4}$ m. *Orraryd*.
- 52 $\frac{1}{2}$ **Ingelstad** (Ofver Torsås), alt. 516 ft., on Torsjön. Joins line from Bredåkra (see Route 19).

ROUTE 23

KARLSKRONA—ALFVESTA, 82 miles

- 0 **Karlskrona**. Line crosses long bridge to Vämмо Island and short bridge to mainland.
- 2 $\frac{1}{2}$ **Gullberna**. Line so far alongside Kalmar and Kristianstad lines. For narrow-gauge line W. to Karlstad, Sölvesborg, and Kristianstad, see Route 19. For narrow-gauge line E. to Kalmar, see Route 24.
- 4 **Torskors**. On leaving, line approaches the Silleå and ascends valley.
- 5 $\frac{1}{4}$ Line crosses the Silleå.
- 5 $\frac{3}{4}$ Line recrosses the Silleå, and later again crosses river.
- 7 $\frac{3}{4}$ **Rödeby**, alt. 180 ft. On leaving crosses the Silleå and continues up valley.
- 11 $\frac{1}{2}$ **Spjutsbygd**, after skirting two small lakes.
- 16 **Nävrågöl**, alt. 292 ft. On leaving line skirts Nävråsjön and Sillhöfden before
- 19 $\frac{3}{4}$ **Holmsjö**, alt. 321 ft. Line leaves the Silleå valley. 24 $\frac{1}{4}$ m. *Saleboda*. 28 $\frac{1}{4}$ m. *Vissefjärda*. On leaving Lake Törn to left.
- 35 **Emmaboda**, alt. 369 ft. Line turns NW. For line from Kalmar, see Route 25. 39 $\frac{1}{4}$ m. *Moshult*. 42 $\frac{1}{4}$ m. *Skruf*, alt. 445 ft.
- 49 $\frac{1}{4}$ **Lessebo**, alt. 490 ft. Paper mill: near Lake Öijen.

miles

Branch NE. to Målerås (narrow gauge 0·6 metre):—*Lessebo*.
 Line ascends. 4 m. *Ekeberga*. 8½ m. *Kosta* (branch N. to
Visjön, 1½ m.). 12¾ m. *Ideholm*. 17 m. *Målerås Södra*.
 Junction with line from Kalmar to Hvetlanda and Nässjö. See
 Route 25.

54¾ *Hofmantorp*, alt. 504 ft., at north end of Lake
Rottnen. Forest continues to *Alfvesta*.

62¼ *Åryd*, alt. 545 ft., on *Årydsjön*.

68¼ Junction of line from *Ronneby* to *Växjö*, see
 Route 19.

70¾ *Växjö*, alt. 537 ft., at north end of Lake *Bergun-
 dasjön*, pop. 8,000. For narrow-gauge line to *Åseda*,
 see Route 26.

73¾ *Räppe* after crossing the broad *Helgeå*.

76¾ *Gemla* after recrossing the *Helgeå* twice.

82 *Alfvesta*, alt. 497 ft. For *Malmö*—*Stockholm* line,
 see Route 1. For line from *Värnamo*, see Route 57.

ROUTE 24

KARLSKRONA—KALMAR (narrow gauge: 0·891 metre), 54 miles

0 **Karlskrona**. Line runs beside *Alfvesta* line to
 2½ **Gullberna**. Line turns E. near coast all the way.
 Line to *Kristianstad* branches to W., see Route 19.

3¾ m. *Lyckeby*. On leaving line crosses the
Lyckebyå. 5½ m. *Lösen*. 8½ m. *Ramdala*, alt.
 49 ft. 11 m. *Jämjöslätt*, alt. 71 ft. 15 m. *Törn-
 åkra*. 17½ m. *Fagelmara*, alt. 25 ft. 20½ m. *Bröm-
 sebro*, alt. 29 ft. 24¼ m. *Norra Tång*. 26¾ m.
Dynekärr.

28½ **Torsås**, alt. 58 ft.

Branch SE. to *Bergkvara*, port for *Öland*, 4 miles (gauge 1·067
 metre).

32¼ m. *Söderåkra*. 36¼ m. *Halltorp*, alt. 53 ft.
 39¼ m. *Gräsgårde*. 39¾ m. Line crosses the *Hagbyå*.
 41 m. *Kvårnlychan*. 43 m. *Vassmolösa*.

miles

Branch W. to Påryd (gauge 0·891 metre):— $2\frac{1}{2}$ m. *Ölvingstorp*. Line ascends. $5\frac{1}{2}$ m. *Tvärskog*. $8\frac{1}{2}$ m. *Runtorp*. Leaving, crosses the Hagbyå. $11\frac{1}{2}$ m. *Påryd*.

$45\frac{3}{4}$ m. *Ljungbyholm*, after crossing the Ljungbyå. $48\frac{1}{4}$ m. *Hossmo*. $52\frac{1}{2}$ m. Line crosses Kalmar—Emmaboda—Hvetlanda line, see Route 25.

54 **Kalmar**, port for Öland. For narrow-gauge line to Berga, see Route 27.

ROUTE 25

KALMAR—NÄSSJÖ, 103 miles

0 **Kalmar**.

$1\frac{1}{2}$ Narrow-gauge line from Karlskrona crosses, see Route 24.

$4\frac{1}{4}$ m. *Smedby*. $8\frac{1}{2}$ m. Crosses the Ljungbyå. $9\frac{1}{2}$ m. *Trekanten*. 12 m. *Västrakulla*.

$17\frac{1}{2}$ **Nybro**, alt. 267 ft.

Branch SW. to Emmaboda:— $6\frac{1}{2}$ m. *Örsjö*, alt. 369 ft., on Örsjön. $10\frac{1}{2}$ m. *Eskilsbryd*. Leaving, line skirts Skarsjön. 16 m. *Lindås*. $17\frac{1}{2}$ m. *Emmaboda*, alt. 369 ft. (For line from Karlskrona to Alfveta, see Route 23.)

22 m. *Brånahult*, alt. 419 ft. 27 m. *Orrefors*. $30\frac{3}{4}$ m. *Gullaskrof*, alt. 584 ft.

$35\frac{3}{4}$ **Målerås**. For narrow-gauge line from Lessebo, see Route 23.

$44\frac{1}{2}$ m. *Säfsjöström*, alt. 711 ft., on Lake Alstern. $50\frac{3}{4}$ m. *Varshult*. $53\frac{1}{4}$ m. *Ekhörfa*, alt. 740 ft.

$57\frac{1}{2}$ **Åseda**, alt. 779 ft. For narrow-gauge line from Växjö to Virserum, see Route 26.

$61\frac{3}{4}$ m. *Ösjöbol*, alt. 906 ft. 66 m. *Milletorp*. 71 m. *Osterkorsberga*, alt. 813 ft. Leaving line skirts Hjertasjön. 76 m. *Snärle*. $78\frac{3}{4}$ m. *Bäckseda*.

$80\frac{1}{4}$ **Hvetlanda**, alt. 604 ft. For line from Målilla to Säfsjö, see Route 29.

miles

- 86 m. *Ekenäsjön*, alt. 760 ft. on Ekenäsjön.
 90 $\frac{1}{4}$ m. *Björköby*, alt. 725 ft. 92 $\frac{3}{4}$ m. *Rödjenäs*.
 Line skirts Lake Nömmen. 95 $\frac{3}{4}$ m. *Stensjön*, alt.
 730 ft. 98 $\frac{3}{4}$ m. *Gissebäck*, alt. 959 ft., after skirting
 Gisshultsjön.
- 103 **Nässjö**, alt. 961 ft. For Malmö—Stockholm line
 and line to Falköping, see Route 1; for line from
 Värnamo, see Route 54; and for line from Oskarshamn,
 see Route 28.

ROUTE 26

VÄXJÖ—VIRSERUM (narrow gauge: 0·891 metre), 54 miles

- 0 **Växjö**, alt. 536 ft.
 3 $\frac{3}{4}$ m. *Evedal*. Line skirts Helgasjön. 10 m.
Norrgårda, alt. 633 ft. 13 m. *Rottne*, alt. 594 ft.,
 after skirting Lake Innaren. 15 $\frac{1}{2}$ m. *Brittatorp*, on
 Lake Innaren. 20 $\frac{1}{2}$ m. *Braås*. 24 $\frac{3}{4}$ m. *Sandreda*,
 alt. 643 ft.; on Lake Madkroken. 27 $\frac{1}{4}$ m. *Klafre-*
ström, alt. 681 ft., ironworks; Ånghultsjön to N.
 and Norrsjön to S. 29 m. *Norrhult*, after sharp turn.
 32 $\frac{3}{4}$ m. *Flybo*.
- 37 **Åseda**, alt. 779 ft. For standard-gauge line Kalmar
 to Nässjö, see Route 25.
 42 $\frac{3}{4}$ m. *Hultånäs*, alt. 808 ft. 46 $\frac{1}{2}$ m. *Triabo*.
 51 m. *Mosstorp*.
- 54 **Virserum**, alt. 438 ft., on Virserumsjön. Line being
 continued to Målilla on Oskarshamn—Nässjö line,
 Route 28.

ROUTE 27

KALMAR—BERGA (narrow gauge: 0·891 metre), 46½ miles

miles

0

Kalmar.

4¼ m. *Klückeberga*. 6 m. *Förlösa*, alt. 54 ft.
9 m. *Läckeby*. 11½ m. *Rockneby*. 12½ m. Line
crosses the *Snärjbäck*. 15 m. *Kåremo*, alt. 72 ft.
18 m. *Haraldsmåla*, alt. 49 ft. 22 m. *Ålem*. Leaving
line crosses the *Alsterå* and turns NW. 25 m.
Blomstermåla.

26½

Sandbäckshult, alt. 132 ft., on the *Alsterå*. Junction
of line from *Mönsterås*, small seaport, 7 miles (gauge
0·891 metre).

Branch SW. to *Grönskåra* and *Åseda* (narrow gauge: 0·891 metre):—

0 m. *Sandbäckshult*. Line crosses the *Alsterå* and ascends slowly.
7½ m. *Abbetorp*, alt. 935 ft. after crossing stream. 11¾ m.
Vacherslätt. 13¼ m. *Knifvingaryd*. Line turns NW. 16½ m.
Alsterbro, alt. 355 ft., on *Stora Hinsjön*, after crossing the
Alsterå. 19½ m. *Skoghult*, on *Hinsjön*. 20¾ m. *Fröskelås*.
23¼ m. *Kråksmåla*, alt. 480 ft. 27 m. *Flatehult*. 29½ m.
Grönskåra. 36¼ m. *Fagerhult*. Line under construction to
Åseda about 12 miles farther.

29¼ m. *Hornsö*. 32¼ m. *Verlebo*, alt. 183 ft.

34¾ m. *Långemåla*, alt. 196 ft.

37½

Ruda, alt. 272 ft.

Branch NE. to *Oskarshamn* (narrow gauge: 0·891 metre):—3 m.

Ekhult, after crossing the *Kvillå*. 6 m. *Finsjö*. 7¾ m. *Fli-*
seryd, after crossing the *Emmå*. 12 m. *Grönskog*. 15 m.
Skorpetorp. 20 m. *Oskarshamn*, seaport.

39½ m. Crosses the *Emmå*. 42½ m. *Högsby*, alt.
225 ft.

46½

Berga, on *Kalfvenasjön*, alt. 324 ft. For *Oskars-*
hamn-Nässjö line, see Route 28.

ROUTE 28

OSKARSHAMN—NÄSSJÖ, 92 miles

miles

0

Oskarshamn.5 m. *Forshult*. 13 m. *Bohult*.

17½

Berga, alt. 324 ft. Junction for narrow-gauge line from Kalmar, see Route 27.19¾ m. *Lillsjödal*. Line skirts Lake Ryningen to 24 m. *Ryningsnäs*. Line ascends valley of Emmå. 27¾ m. *Mörlunda*, alt. 294 ft. 31½ m. *Rosenfors*.

33½

Målilla, alt. 305 ft. For narrow-gauge line to Säfsjö, see Route 29.

41

Hultsfred, alt. 419 ft., after skirting Hulingen Lake. For narrow-gauge line from Västervik, see Route 31. For line to Linköping, see Route 30.47¾ m. *Lönneberga*. Line ascends Emmå valley. 52 m. *Emarp*, alt. 384 ft. 53½ m. Crosses the Emmå. 54½ m. *Mariannelund* after passing Fagersjön. 56¾ m. Recrosses the Emmå. 59 m. *Vallnäs*. 61½ m. *Ingatorp*, alt. 531 ft. 64½ m. *Hjältevad*. Line skirts Lake Hjelten to 67 m. *Brusaholm*, alt. 585 ft. 73 m. *Hult*, alt. 700 ft. 79½ m. *Eksjö*, alt. 695 ft. Branch NE. to Österbymo, 21 miles (narrow gauge, 0·891 metre). 85 m. *Ormaryd*, alt. 823 ft. Branch N. to *Smålands Anneberg*, 4 miles (gauge 0·6 metre). Line winds much and ascends.

92

Nässjö, alt. 961 ft. For Malmö—Stockholm line, see Route 1; for line to Falköping, see Route 1; for line from Hålsingborg and Åstorp, see Routes 44 and 54.

ROUTE 29

MÅLILLA—SÄFSJÖ (narrow gauge : 0·891 metre), 51 miles

miles

- 0 **Målilla**, alt. 305 ft. Line crosses the Emmå, ascends valley and runs W.
 3 m. *Gårdveda*. 8½ m. *Järnforsen*, alt. 341 ft.
 13¼ m. *Kvillsfors*. 17 m. *Tällång*. 20¾ m. *Ädelfors*.
 23¼ m. *Alsheda*. 27 m. *Holsby Brunn*. 30 m.
 Flugeby halt. Leaving line crosses river.
- 32½ **Hvetlanda**, alt. 604 ft. For Kalmar-Nässjö line, see Route 25.
 36½ m. *Hällinge*, after passing between Flögen (N.) and Norrasjön (S.). 39 m. *Myresjö*, alt. 672 ft.
 41½ m. *Landsbrö*. 43½ m. *Lannaskede*. 45¾ m. *Hultagård*. 48½ m. *Gåvan*.
- 51 **Säfsjö**, alt. 754 ft. For Malmö-Stockholm line, see Route 1.

ROUTE 30

HULTSFRED—LINKÖPING, 76 miles

- 0 **Hultsfred**, alt. 419 ft.
- 6¾ *Storebro*, alt. 350 ft.
- 13 **Vimmerby** on the Stångå, alt. 407 ft. For narrow-gauge line from Västervik and Spångenäs, see Route 31.
 14¼ m. Line crosses the Stångå and skirts Lake Krön to 18½ m. *Södra Vi*. 24 m. *Gullringen*.
 27½ m. *Björkhult*. Line skirts Lake Verfveln to 31¼ m. *Verfveln*, alt. 456 ft. 31½ m. Crosses arm of lake and descends the Kisaå valley. 34 m. *Korpklef* halt on Lake Filten. 38 m. *Kisa*, alt. 322 ft., near exit of Kisaå into Kisasjön which line skirts. 44¼ m. *Slätmon*. 49¾ m. *Rimforsa*. 50¾ m. Alt. 300 ft.

miles

- Line passes between Lake Järnlunden to N. and Asunden to S. $52\frac{1}{4}$ m. *Opphem*. $57\frac{3}{4}$ m. *Brokind*, alt. 297 ft., on northern arm of Lake Järnlunden. $60\frac{1}{4}$ m. *Bestorp* on Lake Stora Rengen which line skirts.
- 63 $\frac{1}{4}$ Bjärka-Säby.** Line follows the Stångå.
- Branch SE. to Åtvidaberg:— $3\frac{3}{4}$ m. *Banketorp*. $7\frac{1}{2}$ m. *Morsgruvan*. Copper mines. $11\frac{1}{4}$ m. *Åtvidaberg*. (For narrow-gauge line from Västervik to Norsholm, see Route 31.)
- 65 m. *Hovetorp*. $66\frac{3}{4}$ m. Line crosses the Stångå, alt. 224 ft. $67\frac{1}{4}$ m. *Sturefors*. $69\frac{1}{4}$ m. *Slattefors*. $69\frac{1}{2}$ m. Line crosses the Stångå and continues near it. $70\frac{1}{2}$ m. *Hjulsbro*. $74\frac{1}{2}$ m. *Tannefors*, alt. 156 ft. $75\frac{1}{2}$ m. Junction of Malmö-Stockholm line, see Route 1.
- 76 Linköping**, alt. 131 ft. For narrow-gauge line from Ringstorp, see Route 31. For narrow-gauge line to Lake Vättern, see Route 36.

ROUTE 31

VÄSTERVIK—NORSHOLM—(narrow gauge: 0·891 metre),

73 miles

- 0 Västervik**, seaport.
- 2 $\frac{1}{2}$ Jenny**, after line has skirted Lake Krenarn.
- miles
- 0** Branch SW. to Hultsfred (narrow gauge: 0·891 metre):—*Jenny*. Line ascending, runs SW. to Värkebacksviken, which it skirts.
- 4** *Värkeback* at head of Värkebacksviken on Lake Maren.
- Branch to bay, $\frac{1}{2}$ mile.
- 5 $\frac{1}{4}$ Valstad**. Leaving line skirts Lake Kvarngöl.
- 7 $\frac{3}{4}$ Fårhult**. Leaving line skirts Fårhultssjön.
- 12 $\frac{1}{4}$ Ankarsrum**, alt. 180 ft., at north end of Hällesjön. Ironworks.
- Branch to *Ankarsrumsbruk* on Hällesjön, $\frac{1}{4}$ mile.

miles	miles	
	12½	Branch to Hällesjön, ½ mile.
	13½	Line crosses Långsjön.
	15½	<i>Bresfall</i> , alt. 212 ft. Line skirts Skimasjön and crosses an arm.
	17	<i>Hjorthed</i> , alt. 225 ft. Line skirts Lakes Tyreln and Vämngöl.
	20½	<i>Totebo</i> .
	23	<i>Blägda</i> . Branch N. to Yxern on Lake Yxern, 1½ miles.
	24½	<i>Spångenäs</i> , alt. 388 ft. Branch to Vimmerby (narrow gauge : 0.891 metre) :— 0 m. <i>Spångenäs</i> . Line passes end of Gränsjön. 3 m. <i>Hällerum</i> . 4½ m. Line passes end of Gryssjön. 6½ m. <i>Slättfall</i> . 11 m. <i>Vimmerby</i> , alt. 407 ft. (For Hultsfred-Linköping line, see Route 30.)
	26	<i>Tuna</i> . 29 m. <i>Väderum</i> . 33½ m. <i>Vena</i> . 36½ m. Line reaches Lake Gnötlen and skirts it.
	39½	<i>Hultsfred</i> , on Lake Hulingen. (For line from Oskarshamn to Nässjö, see Route 28 ; for line to Linköping, see Route 30.)
		Leaving Jenny, line skirts Lake Hjorten on way to
10		<i>Almvik</i> on Gamlebyviken, which line skirts to
15		<i>Gamleby</i> , seaport. Station S. of town. Line ascends.
22½		<i>Öfverum</i> . Station S. of town near Lake Ryfren ; iron foundry. Line passes town and east end of Lake Såduggen and continues to ascend.
29½		<i>Storsjö</i> on Storsjön. Line ascends valley of the Storå.
32		<i>Nelhammar</i> , alt. 49 ft. Line skirts Åkervristen.
37½		<i>Falerum</i> . Line continues up Stora valley and skirts Båtsjön.
41½		<i>Forsaström</i> , at north end of Båtsjön. Line ascends tributary valley, passes Lake Alsen and takes a great curve to
47		<i>Åtvidaberg</i> , alt. 262 ft. Hence line winds considerably among lakes. For standard gauge line from Bjärka, see Route 30.
		52½ m. <i>Bersbo</i> , alt. 295 ft., on Grufsjön. 56½ m.

miles

Lakvik, alt. 229 ft., on Ristensjön. 58½ m. *Björsäter*, on Lake Teden which line skirts. 62½ m. *Höfversby*, on Lake Höfvern.

56 **Ringstorp**, alt. 220 ft.

Branch W. to Linköping (narrow gauge: 0·891 metre):—2½ m. *Ringås*. 5 m. *Askeby*. 8½ m. *Vårdsberg halt*, alt. 218 ft. 12½ m. Crosses Mjölby–Stockholm line, see Route 37. 13½ m. *Linköping*, alt. 131 ft., after crossing the *Stångå*. For Malmö–Stockholm line, see Route 1; for narrow gauge line to Lake Vättern, see Route 36; for line from Hultsfred, see Route 30.

67½ m. *Halleby*. 70 m. *Skärkind*.

73 **Norsholm**, alt. 118 ft., after crossing Göta canal. For Malmö–Stockholm line, see Route 1; for narrow-gauge line from Skärblacka, see Route 33.

ROUTE 32

VALDEMARSVIK—NORRKÖPING (narrow gauge: 0·891 metre),
34 miles

0 **Valdemarsvik**.

6½ m. *Gusum*, after crossing stream. 8½ m. Passes N. end of gulf of Lake Yxningen. 12½ m. *Ringarum*, alt. 416 ft.

24½ **Söderköping** on Göta canal.

29½ *Tingstad halt*.

30½ Line to Arkösund branches (narrow gauge: 0·891 metre):—

7½ m. *Kuddby*. 12½ m. *Öfver Husby*. 20½ m. *Kättinge*. 23 m. *Jonsberg*. 27½ m. *Arkösund*, sea-bathing resort.

30½ m. *Kummelby*. 33½ m. Line from Norrköping to Örebro crosses (narrow gauge), see Route 33.

34 **Norrköping**, Östra station. Branch to river, 1 mile. No railway bridge. For Mjölby–Stockholm line, see Route 1.

ROUTE 33

NORRKÖPING—ÖREBRO (narrow gauge : 0·891 metre), 80 miles

miles

- 0 **Norrköping**, Östra station, S. of Motalaström.
- 1 Line crosses Valdemarsvik–Norrköping narrow-gauge line, see Route 32.
 2½ m. *Kneipbaden*. Line runs SW. 5½ m. *Klinga*. 7¼ m. *Lillie*.
- 11 **Kimstad**, alt. 502 ft. Line crosses Malmö–Stockholm line, see Route 1, and ascends valley of Motalaström to NW.
 14¾ m. *Skärblacka*. Line continues up valley, skirts Lake Glan. (Branch S. to *Norsholm* (narrow-gauge : 0·891 metre), 6 m.) 16 m. *Ljusfors*. 25¼ m. *Finspång*, after skirting Lake Dofvern. Ironworks. (Branch E. to *Lotorp*, alt. 505 ft., 4 miles.) Line turns more W. 31½ m. *Sonstorp*, alt. 751 ft. 33¼ m. *Hällestad*, alt. 587 ft. Line turns NW. 36¼ m. *Prästköp*, alt. 745 ft. Line skirts several small lakes. 40½ m. *Skönnarbo*, alt. 905 ft., on Ansjön. 48½ m. *Hjortkvarn*. 57 m. *Svennevad*, at E. end of Lake Sottern, after crossing the Svennevadå.
- 60¾ **Pålsboda**. Line from Göteborg to Katrineholm crosses, see Route 58.
 65 m. *Tarsta*. 66¾ m. *Sköllersta*. 69¼ m. *Kvismaren*. Leaving line crosses the Täljedå. 71¾ m. *Hidingsta*.
- 80 **Örebro**, alt. 295 ft. Station on S. of the Svartå. For Mjölby–Hallsberg–Krylbo line, see Route 37.

ROUTE 34

OXELÖSUND—NYÖKPING—ESKILSTUNA, 62½ miles

- 0 **Oxelösund**, seaport.
 3 m. *Stjärnholm*, alt. 31 ft. 6 m. Crosses the Kilaå.

miles

7 $\frac{3}{4}$

Nyköping, seaport. For Malmö—Stockholm line, see Route 1.

13 $\frac{1}{4}$ m. *Larslund*. 16 $\frac{1}{4}$ m. *Stigtomta*. From here onwards among many lakes. 21 $\frac{1}{4}$ m. *Vrena*, alt. 96 ft. 25 $\frac{1}{2}$ m. *Bettna*, alt. 112 ft. 28 $\frac{1}{2}$ m. Crosses narrow strait across Lake Langhalsen. 29 $\frac{3}{4}$ m. *Vadsbro*, alt. 98 ft. 32 $\frac{1}{4}$ m. Crosses Hedenlundasjön 33 $\frac{1}{2}$ m. *Silinge*.

37 $\frac{1}{4}$

Flen. For Katrineholm—Stockholm line, see Route 58.

42 m. *Mellösa*, alt. 97 ft., after passing several lakes. 46 $\frac{1}{2}$ m. *Hälleforsnäs*, alt. 224 ft. 53 $\frac{1}{4}$ m. *Bälgviken*. 56 $\frac{1}{4}$ m. *Hållsta*. 59 $\frac{1}{4}$ m. *Skogstorp*, after crossing the Hyndevadså on bridge of six arches. Line follows river to

62 $\frac{1}{2}$

Eskilstuna, alt. 43 ft., steel manufactures. For line from Stockholm to Kolbäck, see Route 35.

ROUTE 35

SÖDERTÄLJE—ESKILSTUNA—KOLBÄCK, 68 $\frac{1}{2}$ miles

0 **Södertälje**. Branch SE. crossing Malmö—Stockholm line to *Södertäljehamn* on Hallsfjord, 2 miles.

 $\frac{1}{2}$

Saltskog, on Malmö—Stockholm line, see Route 1.

2 $\frac{1}{4}$

Line turns W., leaving main line to S.

3 $\frac{1}{4}$

Tvetaberg, alt. 138 ft. Line skirts Lake Måsnaren on N.

7 $\frac{1}{2}$ m. *Almnäs*. 11 $\frac{1}{4}$ m. *Nykvarn*. 18 m. *Taxinge-Näsby*. Line skirts Gripsholmsviken, a gulf of Mälaren.

22 $\frac{1}{4}$

Läggesta, after crossing Bondkroken.

Branch NE. to *Mariefred*, 2 $\frac{1}{2}$ miles, pop. 1,300.

23 $\frac{1}{4}$

Recrosses Bondkroken.

25

Åkers Styckebruk, gun foundry. Leaving line crosses the Bergaå.

miles

- Branch NNW. to Strängnäs :— $1\frac{1}{2}$ m. *Valsberga*. 6 m. *Malmby*, alt. 26 ft. 9 m. *Strängnäs*, alt. 22 ft., on gulf of Mälaren.
- 30 $\frac{1}{2}$ *Byringe*, alt. 138 ft.
- 35 $\frac{1}{2}$ **Stålboga**, on Lake Eklången. For line from *Skebokvarn*, see Route 58.
- 38 m. *Eklången*, alt. 105 ft. 41 $\frac{3}{4}$ m. *Årila*, 46 m. *Hällberga*, alt. 119 ft. 50 $\frac{1}{4}$ m. *Eskilstuna södra*.
- 50 $\frac{3}{4}$ **Eskilstuna**, alt. 43 ft., after crossing the *Hyndevadså*. For line from *Flen*, see Route 34.
- 53 $\frac{1}{4}$ **Hällby Brunn**.
- Branch N. to Mälarmälarbaden :—2 $\frac{3}{4}$ m. *Nyby Bruk*. 4 $\frac{1}{2}$ m. *Mälarmälarbaden* on *Vasbyviken*, a gulf of Mälar. 5 $\frac{1}{4}$ m. *Mälarmälarbadhamn*, on *Blacken*, a gulf of Mälar.
- 54 $\frac{1}{2}$ *Folkesta*.
- 57 $\frac{1}{2}$ **Rekarne**, alt. 60 ft.
- Branch W. to Valskog :—3 $\frac{3}{4}$ m. *Östertibble*, alt. 61 ft. 5 $\frac{1}{2}$ m. *Torpslätt*. Line skirts *Galten*. 9 $\frac{1}{4}$ m. *Kungsör*. Leaving line crosses the *Arbogaå*. 14 $\frac{1}{2}$ m. *Valskog*, alt. 46 ft. (For line from *Tillberga* to *Frövi*, see Route 40.)
- 59 $\frac{1}{4}$ m. *Kvikksund*, alt. 26 ft. Leaving line crosses *Kvikksund* between Lake Mälaren (E). and *Galten* (W.) and skirts *Galten*. 62 m. Crosses *Mellansundet*. 63 $\frac{1}{2}$ m. *Strömsholm*. Leaving line crosses *Bergasund*, which leads from Mälaren N. to *Fredensjön* and to *Strömsholm* and runs near *Strömsholm Canal*.
- 68 $\frac{1}{2}$ **Kolbäck**, alt. 39 ft. For line from *Tillberga* to *Frövi*, see Route 40.

ROUTE 36

LINKÖPING—VADSTENA—ÖDESHÖG (narrow gauge :
0.891 metre), 50 miles

- 0 | **Linköping**. Line turns WNW.
- 4 $\frac{1}{4}$ | **Bränninge**.

miles

Branch W. to Skänninge and Väderstad (narrow gauge: 0.891 metre):— $2\frac{3}{4}$ m. *Ledbergskulle*. 5 m. *Björkeberg*. $7\frac{1}{2}$ m. *Vasterlösa*. $11\frac{1}{4}$ m. *Normlösa*. 14 m. *Lindsäter*, after crossing the Svartaå twice. $16\frac{3}{4}$ m. *Skänninge*. (Line from Mjölby to Hallsberg crosses, see Route 37.)

$21\frac{1}{4}$ m. *Bjälbo*. $24\frac{1}{4}$ m. *Appuna*. $27\frac{1}{4}$ m. *Väderstad*. (For line from Mjölby to Hästholmen, see Route 1.)

$5\frac{1}{2}$ m. Crosses the Svartaå. $6\frac{1}{4}$ m. *Vretakloster*, near Göta canal. 8 m. *Gullberg*. $9\frac{1}{4}$ m. *Maspelösa*.
13 $\frac{1}{4}$ Klockrike.

Branch N. to *Borensberg*, on Göta Canal, 5 miles, worked by overhead electric power.

15 Älfvan.

16 $\frac{3}{4}$ Fornåsa.

Branch NW. to *Motala*, on Göta Canal and Lake Vättern, 8 miles.

$20\frac{1}{4}$ m. *Varf*. $24\frac{1}{4}$ m. *Fågelsta*. (Line from Mjölby to Hallsberg crosses, see Route 37.) $26\frac{3}{4}$ m. *Aska*.

30 $\frac{3}{4}$ Vadstena, on Lake Vättern; harbour.

$33\frac{1}{4}$ m. *Arneberga*. 35 m. *Herrestad*. $36\frac{3}{4}$ m. *Rogslösa*. 39 m. *Borghamn*, on Lake Vättern. $41\frac{1}{2}$ m. *Väfversunda*, alt. 328 ft., on Lake Tåkeren. $43\frac{1}{4}$ m. *Omberg*. 45 m. *Alvastra*.

46 $\frac{1}{4}$ Hästholmen, alt. 282 ft.; lake port, line to harbour.
 For standard-gauge line from Mjölby, see Route 1.

50 Ödeshög, alt. 459 ft.

ROUTE 37

MJÖLBY—HALLSBERG—KRYLBO, 157 miles

0 Mjölby, alt. 381 ft.

1 Line crosses the Svartaå.

6 Skänninge, alt. 289 ft. For narrow-gauge line from Linköping to Väderstad, see Route 36.

10 $\frac{1}{4}$ Fågelsta. Narrow-gauge line from Linköping to Vadstena and Ödeshög crosses, see Route 36.

miles

16½ **Motala**, alt. 290 ft., after crossing the Motalaström and Gota canal, on Varviken, a bay of Lake Vättern. Station at east end of town. For narrow-gauge line from Linköping, see Route 36.

17½ Branch line to *Motala Verkstad*; engine factory; ½ mile.

23 Line reaches Lake Salster after skirting Lake Björken.

25½ **Karlsby**, alt. 351 ft., on Lake Salster. Line passes small lakes.

29½ *Degerön*, alt. 364 ft.

33½ *Godegård*, alt. 373 ft.

40½ *Mariedam*, after passing Skeppsjön. Line descends.

47 **Rönneshytta**, alt. 113 ft.

Branch W. to *Kristineberg* on Lake Multen, ½ mile.

48½ **Lerbäck**.

Branch NW. to *Ljungås*, 1½ mile.

Branch SW. to *Askersund* (narrow gauge: 0.891 m.):—1½ m.

Branch line NW. to *Karborg*, 1½ miles. 2½ m. *Skyllberg*.

4 m. *Inglesby*. 8½ m. *Askersund*, alt. 328 ft., on Lake Alsen, connected with Lake Vättern.

52½ *Åsbro*, on Lake Tisaren.

59 **Hallsberg**, alt. 174 ft. For Göteborg—Stockholm line, see Route 58.

63½ **Kumla**.

Branch E. to *Yxhulte*, 4 miles.

69 *Mosås*, after passing Mosjön.

74 **Örebro**, after crossing the Svartå, alt. 87 ft. For narrow-gauge line from Pålshoda and Norrköping, see Route 33. For line from Svartå, see Route 65.

Branch to *Skeback* near mouth of the Svartå, 1 mile.

Crosses the Lillå.

79 *Hovsta*.

81½ *Dylta Bruk*, alt. 126 ft.

84 **Ervalla**. Leaving, line turns NE., crosses the

miles

- Dyltaå, and branches. For line to Strömtorp and Otterbäcken, see Route 38.
- 89 Crosses the Fröviå.
- 89 $\frac{1}{4}$ **Frövi**, alt. 141 ft., on Lake Väringen. Line turns N. For line from Stockholm and Tillberga, see Route 40. For line to Ludvika, see Route 39.
- Branch NW. to Frövi village, 2 miles.
- 92 $\frac{3}{4}$ *Blixterboda.*
- 95 $\frac{3}{4}$ **Sällinge.**
- Branch NW. to *Rockhammar*, 2 miles.
- 100 $\frac{1}{4}$ *Spannarboda.*
- 113 *Krampen.* Narrow-gauge line from Köping to Riddarhyttan crosses, see Route 40.
- 121 *Skinnskatteberg*, between Öfvre Vättern (N.) and Nedre Vättern (S.).
- 126 $\frac{1}{2}$ **Dagarn**, on Lake Dagarn.
- Branch SW. to *Hultebo*, 4 miles.
- 134 $\frac{3}{4}$ **Västanfors**, on Lake Aspen, after crossing the Strömsholm canal. Line turns E. For line from Tillberga to Ludvika and Vansbro, see Route 41.
- 143 $\frac{1}{4}$ **Snyten**, on Lake Snyten, which line skirts. For line from Tillberga to Krylbo, see Route 41.
- 147 *Karbenning.*
- 157 **Krylbo**, alt. 263 ft. For line from Stockholm to Ockelbo and the north and branch to Borlänge, see Route 72.

ROUTE 38

ERVALLA—OTTERBÄCKEN, 73 $\frac{1}{2}$ miles

- 0 **Ervalla.** Line runs NW.
- 5 m. *Järle*, alt. 143 ft. Leaving, line crosses the Järleå.
- 11 m. *Nora*, on *Norasjön*, alt. 94 ft. Line

miles

turns SW. 13½ m. Branch S. to *Gamla Perlyttan*, 1 mile.

14½ **Gyttorp.**

Branch NNW. to Bredsjö:—4½ m. *Stråberg*, after skirting Lake Vikern. 8½ m. *Klacka-Lerberg*, after passing Belgsjön. 11½ m. *Timansberg*, alt. 459 ft. 14 m. *Järnboås*, alt. 384 ft., after crossing the Rastälf. 19 m. Branch W. to *Rosberg*, 2 miles. 20½ m. *Grängen*. (Branch E. to *Slotteberg*, 2 miles.) 25 m. *Hjulsjö*, alt. 535 ft., after skirting Grängen lakes. 29½ m. *Bredsjö*, alt. 600 ft. (For Göteborg–Falun line, see Route 61.)

17½ *Bengtstorp*, after skirting Lake Vikern.

19½ **Vikersvik.** Narrow-gauge line under construction N. to *Striberg*.

27½ **Kortfors**, alt. 522 ft., after crossing the Svartälf.

Branch N. to Grythytted:—1½ m. *Karlsdalsbruk*, alt. 535 ft. (Branch to *Karlsdal*, ½ mile.) 9½ m. *Rockesholm*, alt. 534 ft. Leaving, line skirts Lake Halvars Noran. 17½ m. *Alvestorp*, alt. 544 ft., after crossing the Svartälf. 23½ m. *Grythytted*, alt. 604 ft., after skirting Torrvarpensjön. (For Göteborg–Falun line, see Route 61.)

31 *Granbergssdal.*

36½ **Bofors**, on Lake Möckeln. Steel and dynamite works.

Branch to *Valåsen*, 2½ miles, along N. end of Möckelnsjön.

Leaving Bofors, line crosses the Timsälf. 38½ m. *Karlskoga*.

45½ **Strömtorp**, alt. 377 ft. For Kristiania–Stockholm line, see Route 65.

47½ Branch from *Degerfors*, 1½ miles, on Kristiania–Katrineholm line, see Route 65.

51½ m. *Håkanbol*, alt. 364 ft. 58 m. *Konsterud*, alt. 338 ft. 62 m. *Värmlands Säby*, alt. 190 ft. Line skirts Kolstrandsviken. 70 m. *Gullspång*, alt. 154 ft., after crossing river.

73½ **Otterbäcken**, alt. 115 ft., on Lake Vänern.

ROUTE 39

FRÖVI—LUDVIKA, 62½ miles

miles

- 0 **Frövi.** Line ascends.
- 1½ **Vanneboda** on line from Stockholm and Tillberga, see Route 40.
- 7½ *Vedevåg*, after skirting Högstabosjön, Vedevagsjön, and the Borså.
- 13 **Lindesberg** (Linde), on Lindesjön, alt. 204 ft., pop. 2,550, mining town; after crossing the Lindeå.
- 16 *Gussekby*, near Lake Rossvälen, after ascending valley.
- 22½ **Storå**, alt. 213 ft., after skirting Lake Rossvälen. Line ascends Stora valley.
- Branch SW. to *Guldsmidshyttan*, 2 miles. Silver and lead mines.
Branch SE. to N. to *Stråssa*, 5 miles.
- 23½ Line crosses the Storå.
- 24½ **Vasselhyttan**, alt. 282 ft. Line leaves Storå valley.
- Branch E. to *Storåhyttan*, 1 mile.
- 28½ m. *Rällså*, alt. 328 ft., on Rällsjön. Line continues to ascend. 29 m. Line crosses stream.
- 33½ m. *Bångbro*. Branch E. to ironworks, ¼ mile. Line ascends valley.
- 34½ **Bånghammar**.
- Branch E. to Kloten :—0 m. *Bånghammar*. Line ascends and winds. 6½ m. *Kölsjön*. Line passes several lakes. 13½ m. *Kloten*, between Lake Kloten to S. and Lang Vattnet to N.
- 36 **Kopparsberg**, alt. 490 ft. Ljusnarsberg across river.
- 37½ Line crosses stream and skirts Olofsjön, alt. 503 ft.
- 38½ Line crosses strait between Björken and Olofsjön.
- 40½ Line meets Göteborg–Falun line (see Route 61) and runs parallel to it.
- 40½ *Ställdalen*, alt. 571 ft. on Lake Björken.
- 43½ *Ställborg*. Line parts from Göteborg line.

miles

- 46½ **Branch SE. to Högfors, 3 miles.**
 48 *Silferhöjden* (Hörk). Branch to S. Hörken Lake,
 ¼ mile. Leaving line crosses stream.
 48½ Line passes under Göteborg–Falun line, see Route
 61.
 51 m. *Grängesberg*, alt. 902 ft. 56½ m. *Blötberget*.
 59 *Gonäs* halt. Line skirts S. end of Lake Väsman.
 60½ Line joins Göteborg–Falun line, see Route 61.
 62½ **Ludvika**, alt. 505 ft., on Lake Väsman. For line
 from Göteborg and Kil to Falun, see Route 61. For
 line from Ängelsberg to Vansbro, see Route 41.

ROUTE 40

STOCKHOLM—TILLBERGA—FRÖVI, 118½ miles

- 0 **Stockholm**, central station.
 1¼ *Karlberg*. Branch to *Värten*, 4 miles.
 1½ **Tomtebodå**. Line to Uppsala, Boden, and Hapa-
 randa leaves to N., see Route 72.
 3 m. *Hafvudsta* halt. 3½ m. *Sundbyberg*.
 4½ Branch S. to *Ranhammar*, 1 mile.
 6½ **Spånga**.
 Branch W. to Riddersvik and Löfsta :—3¼ m. *Riddersvik*, and
 4¼ m. *Löfsta*, both on Lofstafjarden, a gulf of Lake Mälaren.
 10¼ m. *Jakobsberg*. 14½ m. *Stäket*. Leaving, line
 crosses Stäket Strait to Stäkesö Island and passing
 through tunnel crosses bridge to 17 m. *Kungsängen*,
 alt. 25 ft. 22 m. *Bro*. 26 m. Passes end of Kal-
 marvik, a gulf of Mälaren. 28½ m. *Bålsta*, alt. 16 ft.
 32¼ m. *Krägga*. 34 m. *Ekolsund*, after crossing
 Ekolsundsvik, a gulf of Mälaren. 36½ m. Crosses
 stream. 39 m. *Grillby*.
 45½ **Enköping**, station N. of town ; line to town. For
 line from Uppsala, see Route 72 ; and for line from
 Gefle and Runhällen, see Route 75.

miles

- 50½ m. *Lundby*. 53½ m. Crosses the *Sagå*. 54 m. *Orresta*. 58½ m. *Tortuna*.
- 62 **Tillberga**. Line turns SSE. For line from *Gäfle*, see Route 75; for line to *Ramnäs*, *Krylbo*, and *Vansbro*, see Route 41.
- 68½ **Västerås**, alt. 28 ft. on Lake *Mälaren*, industrial town. Leaving, line crosses the *Svartå*.
- 74½ *Dingtuna*.
- 79½ Branch N. along *Strömsholm Canal* to *Ramnäs*:—
- 3 m. *Hallstahammar*. 10 m. *Surahammar*, alt. 224 ft. (Branch W. to *Lisjön*, 6½ miles.) 15 m. Line from *Tillberga* joins, see Route 41. 16½ m. *Ramnäs*, alt. 253 ft. (For line to *Ludvika* and *Vansbro*, see Route 41.)
- 80 **Kolbäck**, alt. 39 ft., after crossing the **Strömsholm Canal**. For line from *Eskilstuna*, see Route 35.
- 83½ *Munktorp*, alt. 66 ft.
- 90 **Köping**, alt. 44 ft., after crossing the *Köpingså*.
- | | |
|-------|---|
| miles | Branch NW. to <i>Riddarhyttan</i> (narrow gauge 1.093 metre):— |
| 4½ | <i>Åsby</i> , alt. 111 ft. Line ascends <i>Hedström</i> valley. |
| 8½ | <i>Kolsva</i> , alt. 190 ft. |
| 11 | <i>Gisslarbo</i> . Leaving crosses the <i>Svanå</i> . |
| 12½ | Branch N. to <i>Svansbo</i> , on Lake <i>Lilleavan</i> , 1½ miles. |
| 14 | <i>Bernshammar</i> , alt. 275 ft. |
| 15½ | <i>Karmansbo</i> , alt. 252 ft. |
| 18½ | Crosses the <i>Hedström</i> . |
| 19½ | Branch NNW. to <i>Östanfors</i> , 1½ miles, across <i>Hedström</i> . |
| 21 | <i>Uttersberg</i> , alt. 297 ft. |
| 24 | <i>Krampen</i> . Line from <i>Mjölby</i> to <i>Krylbo</i> crosses, see Route 37. |
| 25½ | <i>Forshammar</i> . |
| 28½ | <i>Riddarhyttan</i> . Branch NW. to <i>Haraldsjön</i> , 2½ miles. Branch N. to <i>Skärsjön</i> , 3 miles. |
- 92½ Crosses the *Hedström*. Line running S. by E.
- 95½ **Valskog**, alt. 46 ft. For line from *Eskilstuna*, see Route 35.
- 98 Crosses the *Lillå*.

miles

- 100½ *Arboga*, alt. 29 ft. on *Arbogaå*. Line turns W.
 103½ m. *Jädersbruk*, alt. 50 ft. 105½ m. *Ålsäng*.
 110 m. *Fellingsbro*, alt. 82 ft. 110½ m. Crosses the
Essingså. 114½ m. Crosses the *Sverketaå*. 115½ m.
Ullersäter.
 117½ **Vanneboda**. For line to *Ludvika*, see Route 39.
 118½ **Frövi**, alt. 141 ft., on Lake *Väringen*. For line
 from *Mjölby* to *Krylbo*, see Route 37.

ROUTE 41

TILLBERGA—LUDVIKA—VANSBRO, 123½ miles

- 0 **Tillberga**.
 8½ m. *Skultuna*. Leaving, line crosses the *Svartå*.
 12½ m. *Svanå*.
 18 Line from *Kolbäck* joins, see Route 40.
 19½ *Ramnäs*. Line turns NNW. up *Kolbäcksa* valley
 along *Strömsholm Canal*.
 22½ m. *Seglingsberg*. 26 m. *Virso*, alt. 243 ft.,
 after skirting *Virsojön*.
 32½ **Ängelsberg**, alt. 253 ft., after skirting Lake *Åman-*
ingen. Line turns W.

miles

- Branch N. to *Krylbo* :—
 0 *Ängelsberg*. Line skirts Lake *Snyten*.
 2½ *Snyten*; iron mines. For *Hallsberg-Krylbo* line,
 see Route 37.
 5 *Högfors*. Leaving crosses river.
 8½ *Norberg*, alt. 442 ft.; iron mines.
 Branch NW. to *Klacksberg* round N. of Lake *Norett*,
 3 miles; iron mines.
 11 *Kärrgrufvan*, alt. 577 ft.; iron mines.
 13½ *Kallmora* halt. Line turns ENE.
 16½ *Andersbenning* halt.
 18½ *Bjurfors*, alt. 406 ft.
 21½ Joins line from *Krylbo* to *Borlänge*, see Route 73.
 22½ *Krylbo*, alt. 263 ft. For line from *Mjölby* and *Halls-*
berg, see Route 37. For *Stockholm-Boden* line, see
 Route 72.

miles	Leaving Ängelsberg line crosses stream.
40 $\frac{3}{4}$	<i>Västanfors</i> , after skirting Lake Aspen.
42	<i>Fagersta</i> , on Strömsholm Canal.
48 $\frac{3}{4}$	<i>Vad</i> , after skirting Lake Barken.
50	Crosses narrow strait in Lake Barken.
53 $\frac{3}{4}$	<i>Söderbärke</i> , alt. 400 ft. where road crosses Barken.
60 $\frac{3}{4}$	<i>Smedjebacken</i> , alt. 338 ft., after skirting S. side of Barken.
62 $\frac{1}{4}$	Alt. 360 ft. Line runs near Lake Leran.
64 $\frac{3}{4}$	<i>Hagge</i> (Sandsta). Leaving, crosses stream and skirts N. side of Nedre Hillan.
67 $\frac{1}{2}$	Crosses narrow strait between Nedre and Öfra Hillen.
70 $\frac{1}{2}$	Ludvika , alt. 505 ft. on Lake Väsman. For line from Göteborg to Falun and Storvik, see Route 61. For line from Frövi, see Route 39.
	After Ludvika line skirts Lake Väsman.
	74 $\frac{1}{4}$ m. <i>Sörvik</i> halt. 80 $\frac{3}{4}$ m. <i>Stensbo</i> .
83 $\frac{1}{4}$	<i>Grangärde</i> . Line leaves lake. Lake Saxen to N.
85 $\frac{1}{2}$	Nyhammar , alt. 607 ft. Line ascends the Norrboå valley.
	Branches to town, each $\frac{1}{2}$ mile.
	94 $\frac{3}{4}$ m. <i>Salån</i> halt, alt. 787 ft. 96 $\frac{1}{2}$ m. Alt. 882 ft.
	Line descends.
100 $\frac{1}{2}$	Björbo , alt. 679 ft., on the Västerdalälff. For line from Falun, see Route 61.
	106 m. Crosses the Västerdalälff. 109 m. <i>Nås</i> , alt. 754 ft.
112 $\frac{3}{4}$	Crosses the Snöa and continues along Västerdal.
117	<i>Dala-Järna</i> .
123 $\frac{3}{4}$	Vansbro , alt. 788 ft., after crossing the Vanå.
	For line from Kristinehamn to Mora, see Route 67.

ROUTE 42

LANDSKRONA—BILLESBOLM, 16 miles

miles

0

Landskrona.1 $\frac{1}{4}$

Line to Eslöf branches, see Route 43.

2 $\frac{1}{2}$ *Säby.*Branch to *Säbyholm*, 1 mile.5 $\frac{1}{2}$ *Vadensjö*, after great curves.7 $\frac{1}{4}$

Line from Hälsingborg to Eslöf crosses, see Route 43.

9 $\frac{1}{2}$ *Kingelstad.*

13

*Ekeby.*Branch SE. to *Skromberga*, 1 $\frac{1}{2}$ miles.

16

Billesholm. For Malmö-Ängelholm line, see Route 2.

ROUTE 43

HÄLSINGBORG—ESLÖF, 29 $\frac{1}{2}$ miles

0

Hälsingborg. $\frac{3}{4}$

Line to Åstorp branches to right, see Route 44.

2 m. *Ramlösa*. Line to Åstorp crosses to left.3 $\frac{3}{4}$ m. *Raus*. Line ascends valley of Kvistaftaå.6 $\frac{1}{4}$ m. *Gantofta*. 9 m. *Vallåkra*. 11 $\frac{1}{2}$ m. Line from

Landskrona to Billesholm crosses, see Route 42.

13 $\frac{1}{4}$ m. *Tågarp*, alt. 91 ft.16 $\frac{3}{4}$ **Billeberga**, alt. 57 ft.Branch W. to Landskrona:—1 $\frac{3}{4}$ m. *Asmundtorp*. 5 $\frac{1}{2}$ m. Line N. to Billesholm and Ängelholm, see Route 2. 6 m. *Landskrona*.20 $\frac{1}{2}$ **Teckomatorp.** For Malmö-Ängelholm line, see Route 2.23 $\frac{1}{4}$ m. *Marieholm*. 25 $\frac{3}{4}$ m. Crosses the Saxå.26 $\frac{1}{2}$ m. *Trollenäs*.

miles

- 29½ **Eslöf.** For Malmö—Stockholm line, see Route 1 ; for line from Ystad, see Route 11 ; for line from Åhus, see Route 14 ; for line from Ängelholm, see Route 46.

ROUTE 44

HÄLSINGBORG—HÄSSLEHOLM, 47½ miles

- 0 **Hälsingborg.**
- 1 Line to Eslöf branches to SE., see Route 43.
Line turns E.
Branch S. along coast to Rå, 2 miles.
1½ m. *Ramlösa*. 2½ m. *Ramlösabrunn*. 5¾ m. *Påarp*. Line turns NE. 8¾ m. *Mörarp*, alt. 147 ft.
- 11½ **Bjuf.** For line from Billesholm to Hylinge, see Route 2.
- 11½ Crosses the Vegeå.
- 12½ *Gunnarstorp*.
- 14 **Åstorp**, alt. 91 ft. Line runs E. For Malmö, Ängelholm line, see Route 2 ; for branch W. to Höganäs and Mölle, see Route 2.
- 15½ **Kärreberga.** Line to Jönköping branches to NE., see Route 54.
- 17½ *Kvidinge*, alt. 100 ft. On leaving, line crosses the Rönneå.
- 20½ **Klippan** ; paper mill. Junction of Ängelholm—Eslöf line, see Route 46.
27 m. *Hyllstofta*, alt. 195 ft. 31½ m. *Perstorp*, alt. 292 ft. Line skirts Hendrikstorpsjön. 36½ m. *Väst Torup*. 40½ m. *Tyringe*, alt. 253 ft. 44½ m. *Finja*, alt. 151 ft. 45 m. Crosses the Almaå.
- 47½ **Hässleholm**, alt. 146 ft. For Malmö—Stockholm line, see Route 1 ; for line from Veinge and Markaryd, see Route 47 ; for line from Kristianstad, see Route 16.

ROUTE 45

HÄLSINGBORG—GÖTEBORG, 149 miles

miles

- 0 **Hälsingborg.** Steam train-ferry from Helsingör in Denmark, $2\frac{1}{2}$ miles.
- $5\frac{1}{2}$ *Ödåkra.*
- $8\frac{1}{2}$ **Kattarp.** For line from Åstorp to Höganäs and Mölle, see Route 2.
- $11\frac{1}{2}$ *Rögle.*
- $13\frac{1}{4}$ *Vegeholm*, after crossing the Vegeå. Sandy waste to
- $16\frac{1}{4}$ **Ängelholm**, on the Ronneå, seaport. For line from Malmö, see Route 2 ; for line to Klippan and Eslöf, see Route 46.
- 18 *Skölderviken*, after crossing the Ronneå. Line leaves coast.
- $21\frac{3}{4}$ m. *Barkåkra.* $24\frac{1}{4}$ m. *Förslöf*, alt. 175 ft.
- $27\frac{1}{4}$ *Grefvie*, alt. 243 ft., near sea. Line descends.
- $32\frac{1}{4}$ *Båstad*, after embankment 79 ft. high. • Bathing resort. Line leaves coast.
- $36\frac{1}{4}$ *Skottorp*, after crossing the Stenså.
- $38\frac{3}{4}$ *Vallberga*, alt. 34 ft.
- $41\frac{1}{4}$ *Laholm*, on the Lagaå.
- 45 **Veinge**, alt. 172 ft. For line to Hässleholm, see Route 47.
- $46\frac{3}{4}$ *Genevad.*
- $49\frac{1}{4}$ *Eldsberga.* Line approaches coast.
- $51\frac{3}{4}$ *Trönninge.*
- $53\frac{1}{2}$ Crosses the Fylleå.
- $56\frac{1}{2}$ **Halmstad**, after crossing the Nisså, seaport. For line to Ljungby and Vislanda, see Route 48 ; for line to Värnamo, see Route 49.
- 57 *Halmstad norra.*
- $62\frac{1}{2}$ *Gullbrandstorp*, alt. 94 ft.
- $65\frac{1}{2}$ *Harplinge*, alt. 112 ft.
- 68 *Brännarp*, alt. 78 ft.

miles

70½

Getinge, alt. 87 ft. Line follows the *Storå*.

73½

Slöinge, after crossing the *Storå*.76½ m. *Heberg*. 79 m. *Skrea*.

82¾

Falkenberg, alt. 20 ft., after crossing the *Åtra*; seaport. For narrow-gauge line to *Limmared*, see Route 51.85¾ m. *Lis*, alt. 56 ft. 88¼ m. *Långås*.

93¼

Tvååker, alt. 55 ft. Leaving, crosses the *Tvååker* canal.

95¾

Himle.

102

Varberg, seaport, granite quarries. For line to *Ullared* and *Kinnared*, see Route 52; for line to *Herrljunga*, see Route 53.

110

Åskloster, at head of *Klosterfjord*. Leaving, line crosses the *Viskeå*.112½ m. *Backa*. 117½ m. *Frillesås*, after crossing the *Lofteå*.120½ m. *Åsa*, on *Kungsbackfjord*. 127¼ m. *Fjärnås*, alt. 18 ft. 129 m. Crosses the *Rolfså*.

132

Kungsbacka, alt. 14 ft., at head of *Kungsbackfjord*.

135

Anneberg. Line ascends the *Kungsbackå* valley.138 m. *Lindome*. 140½ m. *Kållerød*.

144¼

Fässberg. Line from *Göteborg* to *Borås* runs parallel.

146

Almedal. For line from *Göteborg* to *Borås* and *Alfvesta*, see Route 57.

147¾

Line from *Göteborg* to *Laxå* crosses, see Route 58.

149

Göteborg, *Bergslagsbanans* station. For line from *Strömstad*, see Route 62; for line to *Falun* and *Storvik*, see Route 61; for narrow-gauge line to *Lidköping* and *Mariestad*, see Route 59.

ROUTE 46

ÄNGELHOLM—KLIPPAN—ESLÖF, 41½ miles

miles

0

Ängelholm.

1¼ m. *Ängelholm Värn*, after crossing the Ronneå. Line runs E. 3¾ m. *Munkaågård*. 5½ m. *Munkaljungby*. 7 m. *Skälderhus*. Line turns SE. 8¾ m. *Åsbo-Össjö*. 10¼ m. *Källna*.

12

Östra-Ljungby, alt. 135 ft. For Åstorp-Jönköping line, see Route 54.

15

Gråmanstorp. Leaving, line crosses the Veelbyå.

16½

Klippan. For Hälsingborg-Hässleholm line, see Route 44.

21¼

Line crosses the Rönneå, alt. 113 ft.

23 m. *Ljungbyhed*. 25½ m. *Skärålid*. 28½ m. *Röstånga*. 31½ m. *Billinge*. 35¾ m. *Trolleholm*. 39½ m. *Stabbarp*.

41½

Eslöf. For Malmö-Stockholm line, see Route 1 ; for line from Landskrona, see Route 43 ; from Ystad, see Route 11 ; for line from Åhus, see Route 14.

ROUTE 47

VEINGE—HÄSSLEHOLM, 44 miles

0

Veinge. Line runs E.

4¼ m. *Skogaby*, alt. 155 ft. Line ascends the Lagaå valley. 8¼ m. Crosses the Lagaå. 9½ m. *Knäred*, alt. 155 ft. 15¾ m. *Majenfors*. 18½ m. *Råstorp*.

21½

Markaryd, alt. 321 ft., near Lokasjön. For line from Åstorp to Jönköping, see Route 54.

26¾ m. *Emmaljunga*. Line ascends. 30½ m. *Vittsjö*, on Lake Vittsjön. 34¾ m. *Bjärnum* (Åkarp), alt. 288 ft. Line descends. 37¾ m. *Mala*. 40¾ m. *Van-kifva*. 42½ m. Crosses the Almaå.

miles

44

Hässleholm. For Malmö—Stockholm line, see Route 1; for line from Kristianstad line, see Route 16; for line from Hälsingborg and Åstorp line, see Route 44.

ROUTE 48

HALMSTAD—VISLANDA (narrow gauge: 1·067 metre),
70½ miles

0

Halmstad. Line ascends the Fylleå valley.

3 m. *Skedalahed*. 4½ m. *Skedala*, alt. 170 ft. 6¾ m. *Marbäck*. 11 m. *Simlångsdalen* halt, on Lake Simlängen. 16½ m. *Ryaberg*, alt. 243 ft. 20¼ m. *Bygget*, alt. 428 ft. Line leaves river. 24½ m. *Bökö*, at north of Transjön. 27 m. *Lidhult*, alt. 553 ft.

30¾

Åsen.

Branch N. to *Unnen* on Lake Bolmen, 2 miles.

33¼

Byholma.

Branch to lake, 1½ miles.

36¼

36¼ m. *Piksborg*, alt. 487 ft., after crossing the wide Bolmå at exit from lake. 39 m. *Bolmen*, on lake. 41¾ m. *Angelstad*, alt. 448 ft., at north end of Lake Kösen.

48½

Ljungby, alt. 482 ft. Leaving, line crosses the Lagaå.

For Hälsingborg—Markaryd—Jönköping line, see Route 54.

52¾

Tutaryd.

57¼

Ryssby, alt. 473 ft., at N. end of Ryssbysjön.

61

Målaskog. Line starts south end of Lake Tjurken.

70½

Vislanda, alt. 507 ft. For narrow-gauge line from Karlshamn, see Route 21; for Malmö—Nässjö—Stockholm line, see Route 1.

ROUTE 49

HALMSTAD—VÄRNAMO, 71 miles

miles

- 0 **Halmstad.** Line ascends the Nasseå valley on left bank.
 3 m. *Sperlingsholm*. 8½ m. *Åled*. 9¼ m. *Sennan*.
 Line crosses the Nasseå and ascends by right bank.
 11¾ m. *Oskarsström* : jute factory. 14½ m. *Johansfors*. 18½ m. *Fröslida*.
- 24 **Torup**, on the Kilåå ; alt. 292 ft. ; paper mill.
 Line leaves the Nasseå.
 Branch E. up the Nasseå valley to Hyltebruk :—7 m. *Rydöbruck*. 5 m. *Hyltebruck*.
- 29 **Kinnared**, alt. 292 ft. Line leaves by Osterå valley.
 For line from Varberg, see Route 52.
- 36½ **Landeryd**, alt. 419 ft. Line ascending. For line N. to Limmared and Falköping, see Route 50.
 41½ m. *Skeppshult*. 45¼ m. *Smålandsstenur*. Leaving, line crosses the Nasseå.
- 52 **Reftele**, alt. 512 ft.
 Branch N. to Gislaved :—8 m. *Anderstorp*. 12 m. *Gislaved*, after crossing the Nisseå.
 57½ m. *Bredaryd*, alt. 555 ft. 61¼ m. *Forsheda*.
 65 m. *Kärda*, alt. 574 ft.
- 69¼ Line joins Åstorp—Jönköping line, see Route 54.
- 71 **Värnamo**, alt. 478 ft., after crossing the Lagåå. For Göteborg—Alfvesta line, see Route 57.

ROUTE 50

LANDERYD—FALKÖPING, 81 miles

- 0 **Landeryd.**
 3 m. *Broaryd*. 9¼ m. *Burseryd*, alt. 448 ft. 13 m. *Hällabäck*. 18¼ m. *Ekefors*. 20¾ m. *Sjötofta*, alt. 516 ft. 25 m. *Ambjörnarp*, alt. 584 ft.

miles

- 30 *Östra Tranemo*. Line runs parallel to Falkenberg-Limmared narrow-gauge line.
- 33 $\frac{3}{4}$ **Limmared**, alt. 525 ft. Line ascends Månstadå valley. For Göteborg-Värnamo-Alfvesta line, see Route 57; for narrow-gauge line from Falkenberg, see Route 51.
- 38 $\frac{3}{4}$ m. *Månstadskulle*. Line skirts Samsjön. 43 $\frac{3}{4}$ m. *Vegby*. Line skirts Lake Asunden. 48 $\frac{3}{4}$ m. *Åsunden*.
- 52 $\frac{1}{2}$ **Ulricehamn**, alt. 600 ft. Line ascends valley.
- Branch SW. to Borås-Hillared line, 22 miles, under construction.
- 57 $\frac{1}{2}$ m. *Lena*, alt. 590 ft. 60 $\frac{1}{2}$ m. *Dalum*, alt. 596 ft. 62 $\frac{3}{4}$ m. *Blidsberg*. 67 m. *Trädet*, after crossing the *Atrå*.
- 69 $\frac{3}{4}$ **Åsarp**, alt. 728 ft.
- Branch NE. to Tidaholm:—5 m. *Vartofta*, alt. 945 ft. (Line from Nässjö to Falköping crosses, see Route 1.) 8 m. *Kälvene*, alt. 791 ft. 11 $\frac{3}{4}$ m. *Folkabo*, alt. 725 ft. 14 $\frac{1}{4}$ m. *Suntak*, alt. 548 ft. 16 $\frac{3}{4}$ m. *Madängsholm*. 20 m. *Tidaholm*, alt. 476 ft.; match factories. For narrow-gauge line from Skara, see Route 60.
- 73 $\frac{1}{2}$ m. *Kinnarp*. 74 $\frac{3}{4}$ m. *Slutarp*. 80 $\frac{1}{2}$ m. *Falköpings Stad*. For line from Jönköping and Nässjö, see Route 1.
- 81 **Falköpings-Ranten**, alt. 706 ft. For line from Göteborg to Laxå, see Route 58.

ROUTE 51

FALKENBERG—LIMMARED (narrow gauge: 0·891 metre),
62 $\frac{1}{2}$ miles

0

Falkenberg.

4 $\frac{1}{4}$ m. *Vinberg*. 9 $\frac{1}{4}$ m. *Vessigebro*. Line ascends the *Åtrå* valley. 13 m. *Atrafors*. 15 $\frac{1}{2}$ m. *Köinge*, alt. 165 ft. 16 $\frac{3}{4}$ m. *Svartvåhed*, alt. 169 ft.

miles

- 21 $\frac{3}{4}$ **Ullared**, alt. 272 ft. Standard-gauge line from Varberg to Kinnared crosses, see Route 52.
 24 $\frac{1}{4}$ m. *Fridhemsberg*. 28 m. *Lia*. 31 $\frac{3}{4}$ m. *Älfsärd*, alt. 360 ft. 36 $\frac{3}{4}$ m. *Mjöback*, alt. 448 ft. Line passes among several lakes. 39 $\frac{1}{4}$ m. *Öfverlida*. 44 $\frac{3}{4}$ m. *Holsljunga*, alt. 487 ft., after skirting Holtsjön.
- 49 $\frac{3}{4}$ **Axelfors**. For standard-gauge line from Hillared, see Route 57.
- 50 $\frac{1}{4}$ Line crosses the Ätrå and ascends the Lillå valley to ENE.
 54 $\frac{1}{2}$ m. *Strömsfors*. 55 $\frac{3}{4}$ m. *Uddebo*. 59 $\frac{1}{2}$ m. *Tranemo*. Line runs parallel to Landeryd-Limmared line.
- 62 $\frac{1}{2}$ **Limmared**, alt. 525 ft., in valley of the Månstada. For Göteborg-Värnamo-Alfvesta line, see Route 57; for line from Landeryd to Falköping, see Route 50.

ROUTE 52

VARBERG—KINNARED, 41 $\frac{3}{4}$ miles

- 0 **Varberg**.
 6 $\frac{1}{4}$ m. *Grimeton*. 8 $\frac{3}{4}$ m. *Rolfstorp*. 16 $\frac{1}{4}$ m. *Skinnarlyngen*.
- 19 $\frac{1}{4}$ **Ullared**, alt. 272 ft. For narrow-gauge line from Falkenberg to Alexfors, see Route 51.
 25 $\frac{1}{2}$ m. *Gällared*, alt. 321 ft. 30 $\frac{1}{2}$ m. *Ätran*, alt. 360 ft., after crossing the Ätrå. 34 $\frac{1}{4}$ m. *Fegen*, at south end of lake.
- 41 $\frac{3}{4}$ **Kinnared**, alt. 292 ft. For Halmstad-Värnamo line, see Route 49.

ROUTE 53

VARBERG—HERRLJUNGA, 78 miles

miles

0

Varberg. Line leaves town along coast beside Göteborg line for 1 mile.

5 m. *Tofta*. 8 $\frac{3}{4}$ m. *Derome*. Leaving, line crosses the Viskeå and ascends valley. 11 $\frac{3}{4}$ m. *Veddige*, alt. 50 ft. 19 $\frac{1}{4}$ m. *Horred*, alt. 51 ft. 21 $\frac{3}{4}$ m. *Sundholmen*. 25 $\frac{1}{4}$ m. *Björketorp*, alt. 80 ft. 31 $\frac{1}{2}$ m. *Skene*, alt. 201 ft. 34 m. *Kinna*, alt. 205 ft. 39 m. *Fristla*, alt. 214 ft. Cotton mills. 44 $\frac{1}{2}$ m. *Viskafors*, alt. 409 ft. Cotton mills. 47 m. *Rydboholm*. Cotton mills.

52 $\frac{1}{2}$

Borås nedre, alt. 466 ft., on the Viskeå. For Göteborg—Värnamo line, see Route 57.

53 m. *Boråsövre*. 61 m. *Fristad*, alt. 488 ft., after skirting Öresjön. Line ascends the Munkå valley. 64 $\frac{3}{4}$ m. *Borgstena*, alt. 564 ft. 67 $\frac{1}{4}$ m. Line skirts Mollasjön and leaves the Munkå valley. 72 $\frac{1}{4}$ m. *Ljung*, alt. 545 ft.

78

Herrljunga, alt. 381 ft. For line to Öxnered and Uddevalla, see Route 58; for line from Göteborg to Laxå, see Route 58.

ROUTE 54

ÅSTORP—JÖNKÖPING, 139 miles

0

Åstorp, alt. 91 ft.

1 $\frac{1}{2}$

Kärreberga. For line to Hässleholm see Route 44.

4

Line crosses the Rönneå.

6 $\frac{1}{2}$

Östra Ljungby, alt. 135 ft. Junction for line Ängelholm—Klippan—Eslöf, see Route 46. Line ascends valley of the Örkelljungaå.

8 $\frac{1}{4}$ m. Crosses the Örkelljungaå and ascends valley.

miles

9½ m. *Stidsvig*. 13¼ m. *Eket*. 17¼ m. *Örkelljunga*, alt. 224 ft. Line passes N. of *Hjälmsjön*. 21½ m. *Åsljunga*, on *Åsljungasjön*. 25 m. *Vårsjö*, on lake. 27¾ m. *Åsbo-Fagerhult*, alt. 360 ft. Leaving, line skirts *Fedingssjön*. 31¼ m. *Yxenhult*.

36¼ **Markaryd**, alt. 321 ft., on the *Lagaå*. Junction of line from *Veinge* to *Hässleholm*, see Route 47.

38½ m. *Timsfors*. Line ascending the *Lagaå* valley. 41½ m. *Axhult*.

45½ **Strömsnäsbruk**.

Branch E. to *Delaryd* on the *Helgeå*, 8½ miles.

48 m. *Traryd*, alt. 419 ft. 53 m. *Hornsborg*. 57¼ m. *Hamneda*, alt. 423 ft. 60¼ m. *Bäck*. 63¼ m. *Kånna*, alt. 438 ft. 64¼ m. Line crosses the *Lagaå* and continues to ascend valley.

67¼ **Ljungby**, alt. 482 ft. For line from *Halmstad* to *Vislanda* see Route 48.

73½ m. *Lagan*, alt. 497 ft. 77¼ m. *Hvittaryd*, alt. 525 ft. 80¾ m. *Vidöstern*, on Lake *Vidöstern*. 85¾ m. *Hånger*, alt. 526 ft. Line skirts lake. 89¾ m. *Åminne*. 92½ m. Line from *Halmstad* joins, see Route 49.

94¼ **Värnamo**, at head of lake, on the *Lagaå*. For line from *Göteborg* and *Borås* to *Alfvesta* see Route 57.

99½ m. *Hörle*, alt. 507 ft. Line ascending the *Lagaå* valley. 105½ m. *Klefshult*, alt. 572 ft. 111½ m. *Skillingaryd*, alt. 606 ft.

117 **Vaggeryd**, alt. 643 ft., on *Hjortsjön*.

Branch NE. to *Nässjö*:

0 *Vaggeryd*. Line crosses the *Lagaå* and ascends valley.

5¼ *Hok*, after crossing the *Hårå*.

15¼ *Malmback*.

21½ *Fredriksdal*, alt. 1,040 ft.

26¼ *Nässjö*, alt. 961 ft. For *Malmö-Stockholm* line and *Nässjö-Falköping* branch see Route 1; for line from *Oskarshamn* and *Hultsfred* see Route 28; for line from *Kalmar* see Route 25.

miles

- 119 $\frac{3}{4}$ m. *Byarum*, alt. 691 ft. 122 $\frac{3}{4}$ m. *Bratteborg*.
 125 m. *Ekeryd*. 129 m. *Månsarp*, alt. 708 ft.
 131 $\frac{1}{4}$ m. *Smålands Taberg*, alt. 630 ft. Line descends
 the Tabergså valley. 133 $\frac{1}{2}$ m. *Norrahammar*. 135 $\frac{3}{4}$ m.
Hofslätt, alt. 361 ft. 130 $\frac{1}{4}$ m. *Ljungarum*, on Lake
 Vättern.
- 139 $\frac{1}{4}$ **Jönköping**, alt. 299 ft., after skirting Munksjön.
 For line from Nässjö to Falköping see Route 1.
 For narrow-gauge line to Vireda see Route 55.

ROUTE 55

JÖNKÖPING—VIREDA (narrow gauge: 0·6 metre), 25 $\frac{1}{2}$ miles

- 0 **Jönköping**, east station. Line skirts Rocksjön and
 crosses line from Nässjö and skirts Vättern.
 3 m. *Rosendala*, after crossing the Huskvarnaå.
 3 $\frac{1}{4}$ m. Branch SE. to *Huskvarna*, $\frac{1}{2}$ mile. 6 $\frac{1}{4}$ m.
Gisebo, on Vättern. 7 $\frac{3}{4}$ m. *Vistakulle*, alt. 473 ft.
 Line turns E. and skirts Landsjön. 10 $\frac{1}{4}$ m. *Drättinge*,
 alt. 489 ft., on Landsjön. 11 $\frac{1}{2}$ m. *Lyckåsgård*, alt.
 495 ft., on Landsjön. Line running NE. 14 $\frac{1}{4}$ m.
Siringe. 16 m. *Brötjemark*. 19 m. *Bunn*, alt. 656 ft.
 on Lake Bunn. 20 $\frac{1}{4}$ m. *Förnäs*. 25 m. *Hultrum*,
 at S. end of Lake Oren. Line turns SE.
- 25 $\frac{1}{2}$ **Vireda**, alt. 800 ft.

ROUTE 56

GÖTEBORG—SÄRO, 14 $\frac{3}{4}$ miles

- 0 **Göteborg**, Särö station on S. of town.
 2 $\frac{1}{2}$ m. *Järnbrott*. Line skirts coast. 5 m. *Hofås*.
 8 m. *Billdal*. 11 $\frac{3}{4}$ m. *Kullavik*. 14 $\frac{1}{4}$ m. *Släp*.
- 14 $\frac{3}{4}$ **Särö**, after crossing bridge from mainland. Small
 harbour. Sea-bathing resort.

ROUTE 57

GÖTEBORG—BORÅS—ALFVESTA, 137 miles

miles

- 0 **Göteborg**, Bergslagsbanans station Line runs S.
up valley of the Mölndalså.
- 1½ Crosses Göteborg-Laxå-Katrineholm line, see
Route 58.
- 3 **Almedal**. Line from Hälsingborg joins, see Route 45.
- 5½ **Mölndal**. Line turns E.
- 9½ **Mölnlycke**, after passing S. end of Rådasjön.
- 13 **Landvetter**, alt. 195 ft., on Lake Gröen. Line
ascends valley.
- 16 **Härryda**, alt. 272 ft.
- 21½ **Hindås**, on Nedsjön, alt. 389 ft. Line turns S.
- 26½ **Räflanda**, after tunnel, 128 yds. long. Line turns
ENE. and ascends the Sörå valley.
- 29 **Bollebygd**, alt. 236 ft., after crossing the Nolå.
- 35½ **Hultafors**, alt. 492 ft.
- 38½ **Sandared**. Line skirts Viaredsjön and crosses the
Viskå to
- 44½ **Borås**, alt. 466 ft., lower station; manufacturing
town. For line from Varberg to Herrljunga see
Route 53.
- 48½ Branch NE. to **Ulricehamn** under construction,
22 miles.
- 51½ m. **Mälseryd**. Line running SE. 54½ m. **Aplared**.
- 58 **Hillared**, alt. 535 ft., after passing through a tunnel.
Branch S. to Axelfors: 6 m. *Sexdrega*. 11½ m. *Svenljunga*.
16 m. *Axelfors*. For Falkenberg-Limmared narrow-gauge line
see Route 51.
- Leaving Hillared, line crosses the Ätrå.
- 62½ **Länghem**, alt. 591 ft., after passing region of many
small lakes.
- 69 **Limmared**, alt. 525 ft. For line from Landeryd to
Falköping, see Route 50.

miles	
71 $\frac{3}{4}$	<i>Brandsmo</i> , after crossing the Dulstorpså.
77 $\frac{1}{4}$	<i>Grimsås</i> , alt. 681 ft., after desolate swampy region.
81	<i>Hestra</i> .
84	<i>Nissafors</i> , after crossing the Nissaå between Viksjön (N.) and Gusjön (S.).
	89 m. <i>Gnosjö</i> , alt. 565 ft. 95 $\frac{3}{4}$ m. <i>Hillerstorp</i> . Line crosses swampy regions. 100 m. <i>Hädinge</i> , alt. 584 ft., near Horssjön.
106 $\frac{1}{4}$	Värnamo , alt. 478 ft., after crossing the Lagaå. For line from Åstorp to Jönköping see Route 54 ; for line from Halmstad see Route 49.
	On leaving, line crosses the Lagaå and runs SE.
	113 $\frac{3}{4}$ m. <i>Bor</i> , alt. 544 ft. 117 $\frac{1}{2}$ m. Line crosses the Årå. 120 $\frac{1}{4}$ m. <i>Horda</i> , alt. 565 ft. 124 $\frac{1}{2}$ m. <i>Smål.-Rydaholm</i> .
132 $\frac{3}{4}$	<i>Hjortsberga</i> , alt. 517 ft. Line skirts Sjöatorpsjön.
137	Alfvesta , alt. 498 ft., at head of Lake Salen. For Malmö—Stockholm line see Route 1 ; for line from Karlskrona and Växjö see Route 23.

ROUTE 58

GÖTEBORG—LAXÅ—HALLSBERG—KATRINEHOLM—JÄRNA,
254 miles (double line to Jonsered, thence single line)

0	Göteborg . State station. Line ascends the Säfveå valley.
$\frac{1}{2}$	Crosses line from Hälsingborg to Borås, see Routes 45 and 57.
1	Olskroken . Wool factory and barrack on left before arriving. For line Falun and Storvik, which branches to l., see Route 61 ; for line from Strömstad see Route 62 ; for light railway to Lidköping, Mariestad, and Sköfde see Routes 59 and 60.
5 $\frac{1}{4}$	<i>Partille</i> .

miles	
9	<i>Jonsered</i> , on Lake Aspen. Double line ends. Line skirts lake and ascends the Säfveå valley.
12	<i>Lerum</i> , after crossing the Säfveå.
16½	<i>Floda</i> . Line continues up the Säfveå valley.
21½	<i>Norsesund</i> . Crosses the Säfveå and skirts Lake Mjörn.
28	<i>Alingsås</i> , alt. 210 ft., pop. 4,200. Weaving factories. On leaving, line crosses the Säfveå, soon recrosses and runs up valley to
31¾	<i>Torp</i> . Line continues along valley to
36¾	<i>Lagmansholm</i> . Line crosses the Säfveå and runs over moors to
41	<i>Vårgårda</i> . Barren moors to
49	<i>Herljunga</i> , alt. 381 ft. For line from Varberg and Borås, see Route 53.
miles	Branch NW. to Vänersborg and Uddevalla :—
0	<i>Herljunga</i> .
6½	<i>Vedum</i> .
13½	<i>Vara</i> . Light railway Göteborg to Skara crosses, see Routes 59 and 60.
17½	<i>Håkantorp</i> . Light railway Göteborg to Lidköping, &c., crosses, see Route 59.
20½	<i>Ulfstorp</i> .
25½	<i>Grästorp</i> .
26½	Line crosses the Nossåå.
28½	<i>Salsta</i> , near Dettern, bay of Lake Vänern.
34	<i>Lilleskog</i> .
37	<i>Rånnum</i> .
38	Crosses the Gotaälf.
40½	<i>Vänersborg</i> , alt. 146 ft. On leaving, line crosses Karl Grav Canal and passes between Vassbötten (S.) and Vänern (N.).
41½	Line turns sharply SW.
42½	<i>Öxnered</i> . For line from Göteborg to Falun, see Route 61.
45½	<i>Grunnebo</i> .
48½	<i>Ryr</i> , at S. end of Rysjön.
52	<i>Ångebacken</i> .
57	<i>Uddevalla</i> , seaport at head of Byfjord. For Strömstad-Göteborg line, see Route 62; for narrow-gauge line to Bengtsfors, see Route 63.

miles

- 53½ *Fåglavik*, alt. 436 ft.
 56½ *Källeryd*, alt. 492 ft.
 60½ Crosses the Lidå.
 62 *Floby*, alt. 531 ft.
 66½ *Odensberg*, alt. 686 ft. Mösseberg plateau to N.,
 1,070 ft.
 67½ *Markakyrka*, alt. 738 ft., summit of line; no
 station.
 71 **Falköpings-Ranten**, alt. 706 ft. Station lies N. of
 town.
 For line from Nässjö, see Route 1.
 For line from Landeryd and Åsarp, see Route 50.
 Branch E. to *Uddagården* (narrow gauge), 4½ miles.
 80½ **Stenstorp**, alt. 568 ft. For light railway from
 Göteborg and Lidköping to Hjo, see Route 60.
 86½ *Skultorp*, alt. 611 ft.
 90½ **Sköfde**, alt. 459 ft. Light railway from Lidköping
 and Skara, see Route 60.
- miles
 0 Branch NE. to Karlsberg on Lake Vättern :—
 0 *Sköfde*.
 2½ Crosses the Öså.
 5½ *Igelstorp*, alt. 391
 12 Crosses the Tidå.
 13 *Tibro*, alt. 420 ft.
 18½ *Fagersanna*, on Lake Örten.
 23½ *Mölltorp*, at south end of Kyrksjön.
 27½ *Karlsborg*, after skirting Böttensjön, on peninsula
 between Vättern (E.) and Böttensjön (W.), where Göta
 Canal enters Vättern. Branch to fortress on E. penin-
 sula, 1½ miles.
- 95½ Crosses the Orå and runs over level country.
 99½ *Väring*.
 103½ *Tidan*, on the Tidå.
 106½ **Moholm**. For light railway from Mariestad, see
 Route 59.
 114½ *Töreboda*. On leaving crosses Göta Canal.

miles	
123	<i>Älgarås.</i>
128	Gårdsjö. For light railway from Mariestad, see Route 59.
133½	Finnerödja. Branch NW. to <i>Skagernsholm</i> on Lake Skagern, 3½ miles.
142¼	Laxå, alt. 313 ft. For line from N. from Kristiania and Karlstad, see Route 65. Light railway NW. to <i>Oxhult</i> , 1¼ mile; light railway S. to <i>Röfors</i> , 3 miles.
151½	<i>Vretstorp</i> , alt. 242 ft.
161	Hallsberg, alt. 174 ft. Line runs E. For Mjölby-Krylbo line, see Route 37.
169	Pålsboda. Light railway from Norrköping to Örebro crosses, see Route 33.
176½	Kilsmo, at N. end of Lake Sottern. Light railway S. to <i>Brefven</i> , 4 miles.
182¾	<i>Högsjö.</i>
188¼	<i>Vingåker.</i> Line passes Lake Kolsnaren to N. and Lake Viren to S.
196¼	<i>Baggetorp</i> , after skirting Lake Viren.
201¼	Katrineholm, alt. 151 ft. For branch from Malmö-Stockholm line, see Route 1.
207½	<i>Valla.</i>
210½	<i>Kantorp.</i>
215½	Flen. For line from Oxelösund and Nyköping to Eskilstuna, see Route 34.
220½	Skebokvarn. Branch N. to Stålboga :—3 m. <i>Eneboga.</i> 5½ m. <i>Malmköping.</i> 7¼ m. <i>Röl-Smedsta.</i> 9 m. <i>Dunker.</i> 11½ m. <i>Högsten.</i> 14 m. <i>Stålboga.</i> (For line from Södertälge to Eskilstuna, see Route 35.)
225	<i>Sparreholm</i> , on Båfvensjön, which line crosses on embankment.
232½	<i>Stjärnhof.</i>
238	<i>Björnlunda.</i> Line runs near Storsjön.

miles

243½	<i>Gnesta</i> , on Frosjön. Line crosses the Sigtunaälf and rises.
248	<i>Mölnbo</i> , alt. 117 ft.
253½	Joins line from Norrköping and Malmö, see Route 1.
254	<i>Järna</i> , alt. 119 ft.

ROUTE 59

GÖTEBORG—LIDKÖPING—MARIESTAD—GÅRDSJÖ (narrow gauge : 0·891 metre), 134½ miles

0	Göteborg , Västgötabanans station. Line runs parallel to Mellerud line.
1½	Ranger . Line ascends valley of the Gotaälf. Line from Strömstad and Uddevalla crosses from W., see Route 62.
2¾	Lärje . Crosses line from Göteborg to Mellerud and Falun (see Route 61) and turns NE. 8¼ m. <i>Gunnilse</i> . Line ascending valley of the Lärkeå. 12 m. <i>Olofstorp</i> . 17 m. <i>Gråbo</i> . 20½ m. <i>Björboholm</i> . 23½ m. <i>Sjövik</i> . Line skirting Lake Mjörn. 27¾ m. <i>Mjörnsjö</i> , on Lake Mjörn. 30¼ m. <i>Anten</i> , on the channel between Lakes Anten and Mjörn. 37 m. <i>Gräfsnäs</i> , after skirting Lake Anten. 40 m. <i>Sollebrunn</i> . Line ascending valley of the Tarpåå. 41¾ m. <i>Mellby</i> . 44½ m. <i>Gendalen</i> .
47½	Nossebro . Leaving, crosses the Nosså. Branch NW. to Trollhättan (narrow gauge : 0·891 metre):—3¾ m. <i>Främmostad</i> . 6¾ m. <i>Frambo</i> . 10½ m. <i>Norra Björke</i> . 14¼ m. <i>Åsaka</i> . 15¼ m. Crosses the Lerumså. 19¾ m. <i>Trollhättan</i> .
53	Tumleborg . For narrow-gauge line to Skara, Sköfde, and Tidaholm, see Route 60. 55½ m. <i>Arentorp</i> . 57¼ m. <i>Helås</i> .
59¾	Håkantorp . Line from Herrljunga to Uddevalla crosses, see Route 58. 66 m. <i>Järpås</i> . 70¼ m. <i>Lovene</i> .

miles

77	Lidköping , on Lake Vänern ; pier. For line from Skara, see Route 60. Branch SW. to Tun (narrow gauge : 0·891 metre):— $6\frac{1}{4}$ m. <i>Örslösa</i> . $12\frac{1}{2}$ m. <i>Tädnä</i> . $17\frac{1}{2}$ m. <i>Tun</i> , $1\frac{3}{4}$ miles from Lake Vänern. $82\frac{1}{2}$ m. <i>Källby</i> halt, on Lake Vänern which line skirts. Kinnekulle to E. 85 m. <i>Blomberg</i> .
90½	<i>Råbäck</i> .
93	<i>Hällekis</i> . Pier on Vänern to N. Leaving station line crosses the Svartå.
93½	Line from Gössäter joins.
95	Forshem . Narrow-gauge line from Skara and Gössäter joins, see Route 60. 98 m. <i>Österäng</i> . $102\frac{1}{4}$ m. <i>Svaneberg</i> . $103\frac{1}{2}$ m. <i>Lugnås</i> . $108\frac{1}{2}$ m. <i>Leksberg</i> .
110½	Mariestad , on Vänern ; pier after crossing the Tidå. Branch SE. to Moholm (narrow gauge : 0·891 metre):— $5\frac{1}{4}$ m. <i>Jula</i> . Line skirts Lake Ymsen. $11\frac{1}{4}$ m. <i>Moholm</i> . (For Göteborg-Laxå line, see Route 58.) $115\frac{3}{4}$ m. <i>Håsslerör</i> . Leaving, line crosses river. $121\frac{1}{2}$ m. <i>Lyrestad</i> . Leaving, line crosses Göta Canal. $126\frac{3}{4}$ m. <i>Fagerlid</i> . $128\frac{1}{2}$ m. <i>Hofva</i> .
134½	Gårdsjö . For Göteborg-Laxå line, see Route 58.

ROUTE 60

TUMLEBORG—SKARA—SKÖFDE (narrow gauge : 0·891 metre),
44 miles

0	Tumbleborg , on line from Göteborg (Route 59).
5½	<i>Vara</i> . Line from Herrljunga to Vänersborg and Uddevalla crosses, see Route 58. $10\frac{1}{2}$ m. <i>Tråvad</i> , after crossing the Lidå. 12 m. <i>Stora Hof</i> . $15\frac{1}{2}$ m. <i>Kvänum</i> . $17\frac{1}{2}$ m. <i>Öttum</i> , after crossing the Landå. $20\frac{1}{2}$ m. <i>Kålltorp</i> , alt. 295 ft., after crossing the Filiå.

miles

26½

Skara, alt. 360 ft.

Branch NW. to Lidköping (narrow gauge : 0·891 metre) :—8 m.
Vinninga. 13½ m. *Lidköping*. (For line from Håkentorp to Mariestad, see Route 59.)

Branch N. to Gössater and Forshem (gauge 0·891 metre) :—6½ m.
Lundsbrunn. 10½ m. *Götene*. *Kinneulle* to W. 14 m.
 Crosses the Svartå. 16½ m. *Gössäter*. (Branch NW. to *Hällekis*, 2½ miles.) 18 m. *Forshem*. (For line from Lidköping to Mariestad, see Route 59.)

Branch NE. to Timmersdala (narrow gauge: 0·891 metre) :—7½ m.
Istrum. 12½ m. *Lerdala*. 16½ m. *Timmersdala*, after skirting Lake Lången.

31½

Axvall.

miles

Branch S. to Hjo (gauge 0·891 metre) :—
 0 *Axvall*.
 3½ *Bjällum halt*. Line runs near Hornborgasjön.
 6½ *Broddetorp*, alt. 489 ft.
 9½ Line turns E., alt. 624 ft.
 10½ *Segerstad*.
 12 *Stenstorp*, alt. 568 ft. Line from Göteborg to Laxå crosses, see Route 58.
 15 *Dala*, alt. 573 ft.
 17½ *Svensbro*, alt. 450 ft.
 Branch S. to Tidaholm (gauge 0·891 metre) :—2½ m.
Kafås. 4½ m. Branch NNW. to *Öfvertorp*. ½ m.
 5 m. *Ekedalen*, alt. 534 ft. Line turns E. by S.
 9½ m. *Tidaholm*, alt. 476 ft., on the Tidå. (For standard gauge line from Vartofta, see Route 50.)
 19½ *Vretten*. Leaving crosses the Öså.
 Branch NE. to Vretten village, ½ mile.
 23½ *Fridene*.
 24½ Crosses the Tidå. 27 m. Crosses the Yå.
 27½ *Korsberga*, alt. 492 ft.
 28½ Crosses the Lillå.
 31½ *Mofalla*, alt. 440 ft. Line skirts Mullsjön.
 36 *Hjo*, alt. 314 ft., on Lake Vättern. Railway runs to harbour.

34½

Varnhems Kloster, alt. 460 ft

44½

Sköfde, alt. 459 ft. For line to Karlsborg and for Göteborg-Laxå line, see Route 58.

ROUTE 61

GÖTEBORG—FALUN—STORVIK, 329 miles

miles

- 0 **Göteborg**, Bergslagsbanans station.
- 1½ **Olskroken**. Line ascends valley of the Götaälf. Line to Stockholm branches here, see Route 58; line from Uddevalla and Strömstad joins, see Route 62.
- 2½ Light railway, Göteborg to Lake Vänern crosses over (Route 59).
5½ m. *Agnesberg*. 9½ m. *Surte*. 10½ m. *Bohus* (Jordfallet). 15½ m. *Nol*. 19 m. *Älfängen*.
- 22¾ **Alfhem**.
Branch N. to Lilla Edet :—1¼ m. *Lödöse*. 4¼ m. *Garn* 7¼ m. *Göta*. 9 m. *Lilla Edet*, on Götaälf.
26½ m. *Nygård*. 30¾ m. *Präsebo*. 34½ m. *Upphäräd*. 35¾ m. Crosses the Lerumså. 40 m. *Velanda*.
- 43 Line runs parallel with narrow-gauge line from Nossebro to Trollhättan (Route 59).
- 44¼ **Trollhättan**, industrial town. For narrow-gauge line from Nossebro see Route 59.
Branch S. along river to factories 1½ miles, and N. 1½ miles.
- 44½ Line crosses Götaälf by iron bridge.
- 51 **Oxnered**. For line from Herrljunga to Uddevalla, see Route 58.
60¼ m. *Frändefors*. Leaving, line crosses the Frändeforså and ascends r. bank. 65¾ m. *Brålanda*. 68¾ m. Line crosses the Krokå. 70½ m. *Erikstad*.
- 76 **Mellerud**. Line enters region of many lakes. For line from Kristiania and Fredrikshald, see Route 64.
Branch NE. across Holmså to *Sunnanå* on Lake Vänern, 2 miles.
- 81 **Köpmannebro** on Lake Vänern, between it and Lake Sven Fjorden, after crossing Dalsland Canal. Line

miles

continues on isthmus between Lake Vänern and Lakes Svan Fjorden and Animen to

89 m. *Änimskog*, alt. 196 ft. Lakes become fewer. 95½ m. *Tösse*, alt. 186 ft., near Lake Vänern.

101½ **Amål**, alt. 158 ft. On leaving, line crosses arm of Lake Vänern on embankment, ½ mile. Line continues near lake.

111½ *Säffle*, alt. 184 ft. On leaving, line crosses Säffle Canal, leaves Lake Vänern and enters a region of many lakes.

116½ *Värmlandsbro*, alt. 165 ft.

122½ Line crosses Ransundet after skirting Brosjön and Ekholmsjön.

123½ *Segmon*.

128½ *Slottsbron*, after skirting Grumsfjord. Leaving station, line crosses Slottsbrosundet.

130 *Grums*.

137 *Edsvalla*, alt. 161 ft., on the Norsälf, which line crosses on leaving.

144 **Kil**, alt. 322 ft. For line from Kristiania to Karlstad and Laxå, and branch to Fryksta, see Route 65.

miles

Branch NNW. to Torsby :—

0 **Kil**.

3½ Crosses the Norsälf.

6½ *Tolita*.

9½ Crosses the Forsnaså.

12½ *Bäckebron*, alt. 295 ft.

17½ *Västra Äntervik*, alt. 354 ft. Line runs near Mellan Frykensjön.

22½ *Rottneros*. Leaving, crosses the Rottnaälf.

25½ *Sunne*, alt. 266 ft. at head of Mellan Frykensjö On leaving, crosses strait and skirts E. side of Öfre Frykensjön.

38½ *Lysvik*, alt. 249 ft

48 *Oleby*. Line curves round head of Frykensjön to

51 **Torsby**. Small town : ironworks

miles

- 154 **Deje**, alt. 216 ft., on Klarälf, after winding through hilly region. Narrow-gauge line from Karlstad to Högfors crosses, see Route 66.
- 155 $\frac{1}{4}$ m. Crosses the Klarälf by iron bridge and passes Lake Lusten. 157 $\frac{1}{2}$ m. Line enters tunnel $\frac{1}{4}$ mile long. 158 m. *Mölnbacka*. 164 $\frac{1}{4}$ m. *Molkom*, near Molkomsjön, alt. 275 ft.
- 168 $\frac{1}{2}$ **Lindfors**, alt. 426 ft.
- Branch N. to *Bosjön*, alt. 623 ft., 17 miles (narrow gauge).
- 173 $\frac{1}{2}$ **Geijersdal**, alt. 544 ft.
- Branch N. to *Brattforsbruck*, alt. 328 ft., 5 $\frac{1}{2}$ miles.
- 177 $\frac{1}{2}$ *Brattforshyttan*, alt. 426 ft.
- 182 **Daglösen**, alt. 425 ft., at S. end of Lake Daglösen.
- Branch N. to *Filipstad Västra* along Lake Daglösen, and Fernsjön, 5 miles.
- Crosses the Asphytteälf and skirts Lake Daglösen, passes
- 187 N. end of Ostersjön and turns N. parallel to Kristinehamn-Mora line.
- 188 $\frac{3}{4}$ **Herrhult**, alt. 597 ft. Line turns E. For line from Kristinehamn to Mora, see Route 67.
- 195 $\frac{1}{2}$ *Loka*, alt. 640 ft., after winding among several lakes. Line turns N.
- 198 $\frac{1}{4}$ *Skatviken*.
- 199 $\frac{3}{4}$ Crosses strait in course of skirting Lake Torrvärpen.
- 202 $\frac{1}{2}$ **Grythytted**, alt. 604 ft. For line from Kortfors, see Route 38.
- 207 $\frac{1}{2}$ **Hällefors**, on the Svartälf, alt. 607 ft., after skirting Torrvärpen and ascending valley of the Svartälf. Saw-mill and paper factory.
- Branch crosses river to *Hälleforsbruk*, $\frac{3}{4}$ mile, recrosses, and passes under main line twice to Lugnet on Lake Norrälgen, 3 miles.
- 211 $\frac{3}{4}$ *Sikfors*, alt. 623 ft., after skirting south end of Norrälgen and crossing stream.
- 218 $\frac{1}{2}$ **Bredsjö**, alt. 600 ft., after winding among lakes. Ironworks. For line from Gytorp see Route 38.

miles

- 225½ Line crosses the Nittälf after winding past several lakes, alt. 535 ft.
- 227¾ Line crosses north end of Lake **Ljusnarn**, alt. 532 ft.
- 230½ Line approaches Frövi-Ludvika line (see Route 39) after skirting Olofsjön.
- 230¾ **Ställdalen**, alt. 570 ft., also station on Frövi-Ludvika line, which runs more or less near this line to Ludvika.
- 238½ **Hörken**, alt. 837 ft., on Hörksälf along which line has ascended.
- | | |
|-------|---|
| | Branch W. to Annefors and Neva (narrow gauge : 0.802 metre) :— |
| miles | |
| 0 | Hörken. Leaving, line crosses Hörskälf and ascends. |
| 8½ | Nittkvarn, alt. 889 ft. |
| 12¼ | Löfsjovexeln. Trains appear to reverse. |
| 13½ | Strömsdal, on Hyttsjön. |
| | Branch to works, ½ mile. |
| 19 | Gravendal, on the Säfälf, alt. 919 ft. |
| 27¾ | Fredriksberg, alt. 984 ft., at S. end of Säfssjön. Line descends. |
| 29 | Annefors, alt. 919 ft. |
| 35 | Tyfers, alt. 840 ft. |
| 39½ | Neva, on Kristinehamn-Mora line, see Route 67. |
- 240 Line crosses canalized stream after skirting Lake Norra Hörken.
- 241½ Line crosses over Frövi-Ludvika line, see Route 39.
- 243½ m. Grängesberg, alt. 905 ft. 247½ m. Klenshyttan, alt. 688 ft., on Dammsjön.
- 252¾ **Ludvika**, alt. 524 ft., on Lake Väsman. Line turns N. For line from Frövi, see Route 39 ; for line from Tillberga and Stockholm, to Björbo and Vansbro, see Route 41.
- 258½ Gräsberg. Line ascending.
- 263¾ Rämshyttan, near E. end of Lake Rämen, alt. 820 ft. Line turns E. and descends.
- 264½ Branch N. to Iderberget, alt. 820 ft., 6 miles.
- 269½ Ulfshyttan (Skräcka), alt. 689 ft., on Skräcksjön.
- 276 Sellnäs.

miles

282

Borlänge, alt. 456 ft. For line from Krylbo to Insjön, see Route 73.

Branch N. up the Dalälff to Falun-Björbo line, 3 miles, see below.

283

Domnarfvet, on the Dalälff. Blast furnaces, electric works, paper mill. Leaving, line crosses the Dalälff by high bridge of three arches.

286

Ornäs, alt. 357 ft., on Osjön, an arm of Runnsjön. Line skirts lake to

296½

Falun, alt. 371 ft., on the Falnaå at its influx into Tisken, a bay of Runnsjön. South station on lake. Copper works.

Branch W. to Björbo :—0 m. *Falun*. 3¼ m. Line turns W. 7¾ m. *Olsbacka*. 9½ m. *Aspeboda*. 13¼ m. *Bomsarfvet*. 14¼ m. Crosses the Dalälff. (Line from Borlänge, 3 miles, joins.) 17 m. *Kvarnsveden*. 18¾ m. *Repbäcken*, on the Dalälff. (For line from Krylbo to Insjön, see Route 73.) 26¼ m. *Arfslindan*. 33¾ m. *Mockfjärd*. 40¼ m. *Dala-floda*. 44 m. *Björbo*, alt. 679 ft. (For line from Ludvika to Vansbro, see Route 41.)

miles

Branch NW. to Mora :—

0

Falun Södra.

½

Falun Norra, alt. 384 ft.

5½

Bergsgården, alt. 433 ft., on Lake Grychen, which line skirts.

8¼

Grycksbo; paper mill.

16

Sågmyra, alt. 663 ft., after skirting Lake Gopen.

21

Slättberg, after skirting Hyłtsjön.

26½

Västgårde.

30¾

Rättvik, after crossing the *Enå*. For line from Krylbo and Borlänge, see Route 73. Line now skirts Lake Siljan, alt. 542 ft.

34¾

Vikarbyn. 37 m. 39¼ m. *Stumsnäs*. 44¼ m. *Garsås*. 49¼ m. *Fu*.

54½

Mora Noret. For line N. to Orsa and Sveg, see Route 68.

55½

Mora, after crossing the Ostra Dalälff, on peninsula between Orsasjön (N.) and Siljan (S.). For line from Kristinehamn to Älfdalen, see Route 67.

miles

- 299½ *Korsnäs*, alt. 368 ft. Ironworks and saw-mills. Line runs E. along Runnsjön.
- 307 *Ryggen*, alt. 698 ft., on Lake Ryggen, in mountainous sparsely inhabited region.
- 313½ **Born**, alt. 600 ft., after passing many lakes to N. Branch S. to *Glasa*, alt. 426 ft., on Edskensjön, and branch N. to *Korså*, 4 m.
- 316 *Korsån*, alt. 568 ft., at S. end of Hyensjön. Ironworks.
- 318½ **Hofors**, alt. 552 ft., after crossing the Hoå. Ironworks. Branch SE. to Hofors works 1½ mile, with extension to Hosjön and the Hoå, 1 mile.
- 322½ *Granstanda*.
- 327¾ Crosses Stockholm-Boden line.
- 329 **Storvik**, alt. 236 ft. For Stockholm, Boden and Haparanda line, see Route 72; for line from Gäfle, see Route 75.

ROUTE 62

STRÖMSTAD—GÖTEBORG, 112 miles

- 0 **Strömstad**. Small port. Line runs E.
- 3 Line turns S. more or less near the coast.
4¾ m. *Skee*, alt. 14 ft. 10¾ m. *Öfverby*. 13¾ m. *Kragenäs*, alt. 7 ft. 20 m. *Tanum*, alt. 28 ft. 23 m. *Orrekläpp*, alt. 33 ft. 31 m. *Rabbalshede*, alt. 305 ft. 34½ m. *Hällevadsholm*. 38¾ m. *Dingle*, alt. 135 ft.
- 42½ **Smedberg**.
Branch SW. to Lysekil:—1¼ m. *Håbygård*. 6¾ m. *Hallinden*. 10¼ m. *Brodalen*. 12¾ m. *Lökebacken*. 17¾ m. *Lyse*. Line runs S. on to peninsula. 22¼ m. *Lysekil*. Fishing port.
- 44¼ **Munkedal**.
Branch SE to *Munkedalhamn* on Saltkällefjord, 2 miles.

miles	
46½	Passes end of Saltkällefjord.
49½	<i>Hogstorp.</i>
57	Uddevalla , seaport on Byfjord, after crossing narrow-gauge line N. to Bäcke-fors and Bengtsfors, see Route 63 ; for line from Herrljunga and Vänersborg, see Route 58.
63¼	<i>Grohed</i> , alt. 111 ft., after much winding.
69½	<i>Ljungskille</i> , at head of Ljungskille. Line ascends Bratteforså valley.
75	<i>Svenshögen</i> , at head of Stora Hällingen.
82½	<i>Stenungsund</i> , opposite bathing resort on Stenungsjön.
	89 m. <i>Jörlanda</i> , alt. 46 ft. 99 m. <i>Ytterby</i> , alt. 39 ft.
100¼	Crosses the Nordreälf with one fixed span of 275 ft. and a swinging span of 154 ft.
103¼	<i>Säfve.</i>
110	Tingstad.
	Branch SW. to <i>Lindholmen</i> , harbour on N. of Götaälf, 2½ miles.
	Line turns E. and crosses Götaälf, and Göteborg-Lidköping line, see Route 59.
111	Olskroken. Joins line Göteborg to Falun, see Route 61.
111½	Crosses lines from Hälsingborg and to Borås, see Routes 45 and 57.
112	Göteborg , State station.

ROUTE 63

UDDEVALLA—BENGTSFORS (narrow gauge : 0.891 metre),
54 miles

0	Uddevalla. Line winds as it ascends.
	6½ m. <i>Lane.</i> 10½ m. <i>Nättjebacka.</i>
	14¼ m. <i>Ellenö</i> , alt. 216 ft., after crossing narrow strait between Ellnesjön (W.) and Ostersjön (E.).

miles

	16 $\frac{3}{4}$ m.	<i>Ödeborg</i> . Line ascends the Valboå valley.
	18 $\frac{1}{2}$ m.	<i>Färgelanda</i> . Line leaves river. 21 m. <i>Hjärtsäter</i> . 24 $\frac{3}{4}$ m. <i>Högsäter</i> . Line ascends the Högsäterså valley. 31 m. <i>Skällsäter</i> , alt. 440 ft.
37		Bäckefors , alt. 467 ft. Line from Kristiania and Fredrikshald to Mellerud crosses, see Route 64.
42 $\frac{1}{2}$		<i>Ödsköld</i> , alt. 418 ft., at S. end of Ivägsjön.
47 $\frac{3}{4}$		<i>Dingelvik</i> , alt. 457 ft. Line skirts Laxsjön to
51 $\frac{1}{2}$		<i>Billingsfors</i> , alt. 418 ft. Line skirts Dallsland Canal.
54 $\frac{1}{4}$		Bengtsfors , alt. 340 ft.

ROUTE 64

KRISTIANIA—FREDRIKSKALD—MELLERUD, 144 miles

0	Kristiania , Hoved-banegaard. Line leaves to E. and turns S.
2 $\frac{1}{2}$	<i>Backkelaget</i> . Line skirts Bundefjord.
5	<i>Ljan</i> . Line leaves fjord and ascends.
11 $\frac{1}{4}$	<i>Oppegaard</i> , alt. 318 ft.
14 $\frac{3}{4}$	Ski , alt. 420 ft.

miles

	Branch SE. to Sarpsborg (alternative route to main line):—
0	Ski .
3 $\frac{3}{4}$	<i>Kraakstad</i> , alt. 305 ft.
8	<i>Tomter</i> , alt. 321 ft. Leaving, line crosses the Hobolelv.
13	<i>Spydeberg</i> , alt. 351 ft. Line curves much.
15 $\frac{1}{2}$	Crosses the wide Glommen by suspension bridge.
18	<i>Askim</i> , alt. 394 ft.; nickel mines and electricity works.
21 $\frac{3}{4}$	<i>Slitu</i> , alt. 432 ft.
24 $\frac{1}{4}$	<i>Mysen</i> , alt. 451 ft. Leaving, line crosses the Lekum-elv and turns S.
27 $\frac{3}{4}$	<i>Eidsberg</i> , alt. 499 ft.
32	Crosses the Dorja. 33 $\frac{1}{4}$ m. <i>Rakkestad</i> .

miles	miles	
	34½	Crosses the Rakkestadelv. 37½ m. <i>Gaustestad</i> .
	40	Short tunnel, and a second one 1 mile farther.
	44½	<i>Ise</i> .
	49½	Line joins main line, see below, and crosses the Glommen.
	50½	<i>Sarpsborg</i> , alt. 125 ft.
19½		<i>Aas</i> , alt. 314 ft.
24½		<i>Vestby</i> . Leaving station, line crosses the Hölenelv.
25		<i>Saaner</i> .
29½		<i>Kambo</i> . Line reaches Mossesund and skirts it to
37		Moss , seaport. Leaving, line skirts Kristiania fjord.
38½		Turns inland SE. and ascends.
	40½ m.	<i>Dilling</i> , alt. 88 ft. 43½ m. <i>Rygge</i> .
48½		<i>Raade</i> , alt. 59 ft. Line turns S.
50½		Skirts Skinnerflö for 1 mile and then r. bank of Kjölbergelv.
54½		<i>Onsö</i> . Leaving, line crosses the Kjölbergelv and follows l. bank.
58½		Fredrikstad , after tunnel under outskirts; seaport. Leaving, line turns NE. along r. bank of the Glommen.
61		<i>Lisleby</i> .
63½		Crosses an arm of the Glommen.
64½		<i>Greaaker</i> . Line turns E.
66		Sandesund , port on the Glommen; lines to wharves.
67½		Sarpsborg , alt. 125 ft.; timber trade; lines to harbour of Sandesund. For alternative line from Ski, see above
		Leaving, line crosses the Glommen on suspension bridge and turns SSE.
68½		Line from Ski joins.
	73½ m.	<i>Skjeberg</i> , alt. 128 ft. 78 m. <i>Döle</i> , alt. 52 ft.
	81 m.	<i>Berg</i> .
82½		Line reaches Iddefjord, which it skirts to E.
84½		Fredrikshald , after crossing the Tistedalelv. Large timber port.

miles

- 86 *Tistedalen*, alt. 269 ft., after short tunnel; canal port. Line soon turns S.
- 92 *Aspedammen*, alt. 564 ft., summit of line, after several tunnels.
- 97½ *Prestebakke*, near S. end of Örsjön. Timber yards.
- 103¾ **Kornsjö**, alt. 475 ft. Norwegian customs house.
- 104½ Crosses the frontier.
- 108½ **Mon**, alt. 534 ft. Swedish customs house.
- 111¼ Short tunnel.
- 114¼ *Hökedalen*.
- 117 **Ed**, alt. 472 ft., at S. end of Lake Stora Le, N. end of which is Norwegian.
- Branch to lake, 2 miles; train reverses on way.
- 122½ *Tingvalla* halt, alt. 567 ft. Marshy forest region.
- 128 **Bäckefors**, alt. 467 ft. Narrow-gauge line from Uddevalla to Bengtsfors crosses, see Route 63.
- 133 Skirts Teåkersjön after traversing tunnel.
- 134¼ *Dalskog*.
- 138½ *Rostok*, after many windings.
- 141 Crosses S. end of Kålungen.
- 144 **Mellerud**. For line from Göteborg to Falun and Storvik, see Route 61.

ROUTE 65

KRISTIANIA—KARLSTAD—LAXÅ, 215 miles

- 0 **Kristiania**, Hoved-banegaard. Line ascends quickly.
- 1½ Line from Bergen and Roa joins, see Route 92.
- 2¾ *Bryn*, alt. 260 ft.
- 4½ **Alnabru**.
- Branch W. to *Grefsen*, 2 miles, on Roa-Kristiania line, see Route 92.
- 7 m *Grorud*, alt. 420 ft. 11½ m. *Strømmen*, alt. 485 ft.

miles

- 13 **Lilleström**, alt. 355 ft., after crossing the Nitelv :
river port, with lines to wharves.
For line from Trondhjem and Hamar, see Route 88.
Leaving, line crosses delta of the Lerelv in Lake
Öieren.
- 18 **Fetsund**. Leaving, line crosses the wide Glommen
and ascends l. bank.
- 23 **Sörumsand** (Bingsfos). Line continues to ascend
valley of Glommen to Kongsvinger.
Narrow-gauge line SE. to Skullerud, on Örjesjön,
see Route 91.
25½ m. Crosses stream. 26½ m. *Blaker*. 30½ m.
Haga. 36 m. *Aarnes*. 41½ m. *Saeterstöen*, alt.
443 ft. 45½ m. *Disenaen*. Leaving, crosses the
Saeteraa.
- 48½ *Skarnaes*, alt. 453 ft. Road bridge over the Glom-
men. Line, following river, turns ESE.
- 54½ *Sander*, alt. 466 ft. Road bridge over the Glommen.
- 57½ *Galterud* halt.
Branch SE. to village, ½ mile.
- 62½ **Kongsvinger**, alt. 483 ft., fortress till 1905. Road
bridge over the Glommen.
For line from Elverum, see Route 89.
Line leaves Glommen valley and turns SSE. and
skirts Lake Vinger.
- 69¾ *Aabogen*, alt. 476 ft. Leaving station, line skirts
Aaklangen.
- 76 *Eidskogen*, alt. 443 ft. Sawmills. Line descends
Vrangsaa valley.
- 79 *Skotterud*, alt. 423 ft. Sawmills.
- 82¾ *Magnor*, alt. 430 ft., on the Vrangsaa. Sawmills ;
glass and iron works.
- 84¾ Norwegian-Swedish frontier.
- 88¾ **Charlottenberg**, alt. 446 ft. Swedish customs sta-
tion.
- 93 Line reaches Bysjön and skirts it to

N. AND S.

A &

miles	
97 $\frac{1}{4}$	<i>Åmot</i> , alt. 275 ft., between Bysjön and Lake Flagan. Line skirts Lakes Flagan and Nysöcken.
104	<i>Ottebol</i> , alt. 245 ft. Leaving, line crosses stream from Nysjön to Glafs fjorden.
109 $\frac{1}{2}$	Arvika , on Kyrkviken, a bay of Lake Glafs fjorden.
119	<i>Edane</i> , at head of Värmelensjön.
123 $\frac{1}{2}$	<i>Brunsborg</i> , after crossing Värmelensjön by a viaduct 710 yds. long and passing short tunnel 300 yds. Siding to lake, $\frac{1}{2}$ mile.
128 $\frac{1}{2}$	Line ascends valley of Säfvälf, skirts Lake Säfveln. Crosses the Säfvälf.
130 $\frac{1}{2}$	<i>Boda</i> . Line passes through high country with many lakes.
137 $\frac{1}{2}$	<i>Fagerås</i> .
139	Line crosses Norsälf by iron bridge 198 yds. long and 63 ft. high, resting on five iron piers with granite foundations.
141 $\frac{1}{2}$	Kil , alt. 322 ft. For line, Göteborg to Falun and Storvik and branch to Torsby, see Route 61. Branch N. to <i>Fryksta</i> on Nedre Frykensjö, alt. 213 ft., 2 miles.
148 $\frac{3}{4}$	<i>Skåre</i> , on Klarälf. Line crosses branch of Klarälf.
153	Karlstad , alt. 174 ft., at north end of Lake Vänern.
153 $\frac{1}{2}$	Karlstad östra , alt. 180 ft. For narrow-gauge line to Filipstad, see Route 66. Line crosses the Klarälf by long bridge and skirts lake to
157 $\frac{1}{4}$	<i>Alster</i> , alt. 148 ft., after crossing the Alsterälf.
159 $\frac{3}{4}$	<i>Skattkärr</i> , on Grensviken. Line continues along lake.
165 $\frac{1}{2}$	Crosses the Glomma.
167	<i>Våse</i> , alt. 180 ft. Line some distance from lake.
171 $\frac{1}{4}$	Crosses the Ölma.
172 $\frac{1}{2}$	<i>Ölme</i> , alt. 158 ft., near Olmeviken. Line passes end of Varmumsviken.
177 $\frac{1}{2}$	Kristinehamn , alt. 164 ft. For line to Mora, see Route 67.

- miles
- 185 *Björneborg*, alt. 386 ft., at S. end of Lake Vismen : iron foundries. Line winds much and has steep gradients.
- 191 $\frac{3}{4}$ **Strömtorp**, alt. 377 ft.
For line from Ervalla to Otterbäcken see Route 38.
- 193 $\frac{1}{2}$ **Degerfors**, alt. 295 ft., after crossing the Letälf ; iron works.
Branch SW. to Ervalla—Otterbäcken line, 1 $\frac{1}{2}$ mile.
Branch N. along Letälf to Lake Möckeln, 2 $\frac{1}{2}$ miles.
- 201 **Svarta**, alt. 311 ft., on Stora Björkensjön ; iron foundries.
Branch SE. to *Svartåbruk*, on Lilla Björkensjö, $\frac{1}{2}$ mile.
Branch E. to Örebro :—7 $\frac{1}{2}$ m. *Mullhyttemo*. 11 $\frac{1}{4}$ m. *Kvistero*, alt. 205 ft. Leaving, line crosses the Svartå. 12 $\frac{1}{4}$ m. *Gropen*. 14 m. *Fjugesta*. 17 m. *Hidingebro*. Leaving, line crosses the Svartå. 20 m. *Vintrosa*, alt. 160 ft. 21 $\frac{3}{4}$ m. *Latorpsbruk*. 24 $\frac{3}{4}$ m. *Gräfveby*, alt. 141 ft. 27 $\frac{1}{4}$ m. *Karlslund*. 30 $\frac{1}{4}$ m. *Örebro*, alt. 87 ft. For Mjölby—Krylbo line see Route 37.
- 207 $\frac{3}{4}$ m. *Hasselfors*, at N. end of Lake Toften.
211 $\frac{3}{4}$ m. *Porla*.
- 214 $\frac{3}{4}$ **Laxå**, alt. 313 ft. For Göteborg—Stockholm line see Route 58.

ROUTE 66

KARLSTAD—FILIPSTAD (narrow gauge: 0·891 metre), 92 miles

- 0 **Karlstad Östra**, alt. 180 ft. Line ascends the Klarälf valley.
4 $\frac{1}{4}$ m. *Edsgaten*, on Lake Alstern, which line skirts
7 $\frac{1}{4}$ m. *Ulfsby*. 11 $\frac{1}{2}$ m. *Skifed*. Leaving, line crosses the Klarälf. 12 $\frac{3}{4}$ m. *Forshaga*, alt. 195 ft.
- 18 **Deje**. Göteborg—Falun line crosses, see Route 61.
19 m. *Dejeforsbruk*, after recrossing the Klarälf.
24 m. *Öfvre Ullerud*. 27 m. *Olsäter*, alt. 246 ft.
31 m. *Ransäter*, alt. 269 ft. 37 m. *Munkfors*. 41 $\frac{1}{2}$ m. *Höje*.

miles

- 45½ Branch SE. to *Skymnäsboden*, on Klarälf, 1½ miles.
46½ m. *Myra*, alt. 456 ft. 49 m. Crosses outlet
from Rådasjön to Klarälf. 49½ m. *Råda*. Line
skirts Rådasjön.
- 51¾ **Sjögränd.**
Branch N. to *Edebäck*, on the Klarälf, alt. 450 ft, 3 miles.
Line rounds N. end of Rådasjön.
53¼ m. *Uddeholm*. Line ascends the Ufå valley.
54½ m. *Stjärnsfors*. 54¾ m. Crosses the Ufå and
skirts Lake Värnullen.
- 57¾ **Hagfors**, alt. 505 ft. Terminus of trains from either
end of line.
- 60¾ *Geijersholm* halt, alt. 620 ft. Northern point of line,
which now turns SE.
65¾ m. *Deglundsbacken* halt, alt. 738 ft. 72 m.
Sundsjön, alt. 856 ft. 75 m. *Motjärnshyttan*, alt.
699 ft.
- 82 **Nordmark**, alt. 534 ft.
Branch E. to *Taberg*, on Taberg Canal, 2½ miles.
84¼ m. *Finnmossen*, alt. 534 ft. Line skirts Lersjön.
85¾ m. *Fogdhyttan*. 89½ m. *Angrufvorna*, alt. 487 ft.
- 90¾ **Finshyttan**, alt. 433 ft. For line from Nyhyttan
(standard gauge) see Route 67.
- 92 **Filipstad Västra**. For line from Daglösen see
Route 61.

ROUTE 67

KRISTINEHAMN—MORA, 137 miles

- 0 **Kristinehamn**, on Lake Vänern.
- 3 Branch NW. to *Älfbro*, 1½ miles.
- 6 *Sjöändan* halt, on Bergsjön, which line skirts.
Canalized river to Filipstad.
- 10 *Nässundet*, on Ullvätternsjön. Leaving, line crosses
sound and skirts Ullvätternsjön.

miles

17 **Storfors**, alt. 380 ft. ; iron mines. Line passes end of Mögsjön and skirts Östersjön.

Branch SW. to Lake Öjevättern, 2 miles.

24½ **Nykroppa**, alt. 508 ft. ; iron mines. Line runs parallel to Göteborg–Falun line to

26½ **Herrhult**, alt. 597 ft. ; iron mines.

For Göteborg–Storvik line see Route 61.

28¾ **Gammalkroppa**, in region of many lakes.

32½ **Nyhyttan**, alt. 617 ft.

Branch to Filipstad :—3 m. *Filipstad Östra*. 4½ m. *Finshyttan* alt. 433 ft. For narrow-gauge line to Hagfors see Route 66.

35½ **Persberg**, alt. 676 ft.

Branch E. to town skirting Lake Yngen, 2½ miles.

Line skirts Storra Horrsjön and Liten Horrsjön and Lake Långban to

42¾ **Långbanshyttan**, on isthmus between Hyttsjön and Långban.

45¾ **Långbansände**, alt. 722 ft., after continuing along Långban.

52½ **Lesjöfors**, alt. 781 ft. Line skirts Lesjön and Lake Näsramen to

56½ **Vermlands Rämen**, on Näsramen.

60¾ **Ofvorsen**, after skirting Slädsjön.

Branch to works, 1 mile.

65¾ **Neva**.

For narrow-gauge line from Hörken and Annefors see Route 61.

72½ **Sågen**, alt. 858 ft. Leaving, line crosses the Svart-älf.

80 **Vakern**.

86¾ **Tretjärn**.

Branch E. to Eldforsen, 2 miles.

87¾ Line crosses Vesterdalälf.

92 **Vansbro**, alt. 788 ft.

miles

For line from Ludvika see Route 41.

Branch SE. to river, 1 mile.

92½

Line crosses Vanälff and ascends valley.

100½

Van halt.

106

Brintbodarne.

miles

0

Branch W. to Malung and Limesforsen :—

10½

Brintbodarne. Line crosses Vanälff and ascends.

17½

Öje, at south end of Öjosjön.*Malung*, on Vesterdalälff. Line ascends Vesterdalälff.

21½

Vallerås. Line turns NW.

23½

Malungsfors. 33 m. *Tandö.*

37

Limesforsen.

Line being continued to Lima, 2 miles.

112

Gäfvunda, alt. 878 ft., on Vanälff, at south end of Gafvundasjön.

119½

Vimo, alt. 945 ft., after passing Lake Säxen and Kätbbsjön.

130

Vika.

136½

Mora, alt. 530 ft., at mouth of Osterdalälff between Orsasjön (N.) and Siljan (S.).

Branch NW. to Älfdalen :—0 m. *Mora.* Line ascends valley of Österdalälff. 1½ m. *Morkarlby.* 5½ m. *Eldris.* 13½ m. *Gopshus.* 16½ m. *Oxberg.* 19 m. *Blyberg*, after crossing Österdalälff. 22 m. *Gåsvarf.* 25 m. *Älfdalen.*

137½

Mora Noret, after crossing strait. For line to Bollnäs see Route 68 ; and for line from Falun see Route 61.

ROUTE 68

MORA—BOLLNÄS, 82 miles

0

Mora Noret. Line skirts Orsasjön.

8¾

Orsa.

Branch N. to Sveg :—6¾ m. *Tallhed.* 17½ m. *Emådalen.* 31½ m. *Älfo.* 42½ m. *Lillhamra.* 46¾ m. *Tandsjö.* Line skirts

miles

- many lakes as it ascends. 54½ m. *Fågelsjö*. 62½ m. *Kropp-tjarn halt*. 75½ m. *Sveg*, on the *Ljusnå*.
- 15 *Mässbacken*. Line ascends valley.
- 19¼ *Skattungbyn*. Line skirts Skattungsjön.
- 28½ *Furudal*, after crossing strait between Skattungsjön (N.) and lake to S.
- 39 **Göringen**.
Branch SE. to *Dalfors* on Lake Amungen, 2 miles.
- 50 **Voxna**.
Branch NNW. up the Voxnaälf valley to *Lobonäs*, 18 miles (narrow gauge: 0.802 metre).
59½ m. *Edsbyn*. Line descends the Voxnaälf valley.
62 m. *Ofvanåker*. 69 m. *Alfta*. 71½ m. *Runemo*.
74½ m. *Söräng*.
- 80 Joins line from Stockholm and Uppsala to Boden and Haparanda, see Route 72.
- 82 **Bollnäs**, alt. 187 ft.

ROUTE 69

STOCKHOLM—SALTSJÖBADEN (electric railway), 9½ miles

- 0 **Stockholm**, Stadsgård station, connected with central station.
- 1 *Henriksdal*, after passing through tunnel, 700 yds.
- 1½ *Sickla*.
- 2 *Nacka*, after a second tunnel and traversing isthmus between Svindelsviken (E.) and Hammarbysjön (W.).
- 3 *Järla*, after skirting NW. end of Järласjön.
- 3½ *Storängen*.
- 4¾ *Saltsjö-Dufnäs*, at W. end of Lännerstasund.
- 6 *Östervik*. Line running along S. of Lännerstasund.
- 6¾ *Fisksätra*.
- 8 **Igelboda**.
Branch S. to *Solsidan*, port of Saltsjöbaden at S. end of Neglinge-viken 1¾ miles.

miles

8½

Neglinge.Branch E. to *Lastbryggan* on sea, ½ mile.

Crosses strait by bridge after leaving Neglinge.

9¼

Saltsjöbaden. Sea-bathing resort.

9½

Dalaröbryggan pier.

ROUTE 70

STOCKHOLM—HALLSTAVIK (narrow gauge: 0·891 metre; electric railway as far as Ösby and Djursholm), 61 miles

0

Stockholm, Östra station.

1

Crosses line from Karlberg to Värtan (see Route 72) and runs N.

2

Freskati halt.

2½

Crosses narrow strait between Brunnsviken (W.) and Lillavårten (E.).

3

Stocksund, after crossing Stocksund. Residential suburb.Branch E. to *Långängen*, ¾ mile.

3¾

Mörby halt.

4½

Ösby (Djursholms Ösby).

miles

Branch E. to Djursholm narrow (gauge: 0·891 metre):—

0

Ösby.

½

Branch N. to *Altorp*, 1 mile. Loop being built to Svalnäs, see below.

1¼

Djursholms Sveavägen halt. Residential suburb of Stockholm.

2½

Djursholms Framnäs viken.

3¼

Djursholms Svalnäs halt.

5¾

Danderyd.

7

Näsby.

miles

Branch NE. to Österskär (narrow gauge 0·891 metre):—0 m. *Näsby*. 2½ m. *Viggbyholm*. 6 m. *Rydbo*. 8½ m. Crosses the *Åkerså*. 9½ m. *Runö*. 10 m. Crosses the *Åkers* canal. 10½ m. *Åkersberga*. 11½ m. *Österskär*, on *Trälhavet*.

11½ m. *Täby*. 14½ m. *Vallentuna*. 19¾ m. *Lindholmen*, after skirting *Lindholmsjön*. 21½ m. *Frösunda*. 23½ m. Crosses the *Närtunaå*. 24 m. *Ekskogen*. Leaving, crosses the *Karstaå*. 26½ m. *Karsta*, alt. 51 ft.

31½ *Rö*, after skirting *Kårstaviken* and *Sparren*.

35 **Rimbo**, alt. 44 ft. For narrow-gauge line from *Norrtälge* to *Uppsala*, see Route 71.

42½ m. *Sättraby*. 45 m. *Erken*, at W. end of Lake *Erken*. 48 m. *Edsbro*, alt. 40 ft., at W. end of Lake *Närdingen*. 51¾ m. *Ununge*, after skirting *Närdingen*. 54½ m. *Skebobruk*, alt. 41 ft. Line descends the *Skeboå* valley. 57 m. *Edebo*.

58¾ **Häverösund**, after crossing the *Skeboå*.

61 *Hallstavik*.

ROUTE 71

NORRTÄLGE—UPPSALA (narrow gauge : 0·891 metre), 50 miles

0 **Norrtälge**. Line runs N. and then turns SE.

6¾ m. *Syninge*. 8½ m. *Finsta*. Line skirts Lakes *Björken* and *Kundby*.

12¾ **Rimbo**, alt. 44 ft. Line turns NW. For narrow-gauge line Stockholm to *Hallstavik*, see Route 70.

17¾ m. *Rånäs*, alt. 73 ft. Leaving, skirts *Langsjön*. 24½ m. *Knutby*, alt. 64 ft. 29½ m. *Faringe*, after skirting Lake *Kärften*. Line turns SW. 33¾ m. *Almunge*, alt. 70 ft. 36¾ m. *Länna*, after crossing *Langsjön*. 40½ m. *Marielund*. 43 m. *Bärby*.

50 **Uppsala östra**. For line from Stockholm to *Krylbo* and the north, and branch to *Enköping*, see Route 72 ; for line from *Gäfle*, see Route 74.

ROUTE 72

STOCKHOLM—UPPSALA—KRYLBO—BODEN—HAPARANDA,
809 miles

miles

0	Stockholm , central station. Line runs along Klara-viken.
1½	Karlberg . Branch E. to <i>Värtan</i> harbour on E. of town 3½ miles.
2	Tomteboda . Branch to <i>Värtan</i> line, above, ¼ mile. For line to <i>Tillberga</i> and <i>Ludvika</i> , see Route 40.
3¼	<i>Hagalund</i> halt.
4½	<i>Järfva</i> , alt. 41 ft.
8¼	<i>Tureberg</i> , near <i>Edsviken</i> .
12	<i>Rotebro</i> .
15	<i>Väsby</i> .
20	<i>Rosersberg</i> .
23	<i>Märsta</i> .
30¾	<i>Knifsta</i> .
37	<i>Bergsbrunna</i> .
38½	Crosses the <i>Säfvaå</i> .
41¼	Uppsala . Double track ends. For line from <i>Gäfle</i> , see Route 74 ; for narrow-gauge line from <i>Norrtälge</i> , see Route 71.

miles

	Branch SW. to <i>Enköping</i> :—
0	<i>Uppsala</i> .
1½	<i>Uppsala norra</i> . Line leaves main line after crossing the <i>Fyriså</i> , and turns S.
3	<i>Ekelybruk</i> . 4 m. Crosses the <i>Håggå</i> .
10	<i>Nafvestabro</i> .
12¾	<i>Balingsta</i> , alt. 63 ft. Leaving line crosses the <i>Säfvaå</i> .
16½	<i>Örsundsbro</i> , after crossing the <i>Örsundså</i> .
19½	<i>Biskopskulla</i> .
22¼	<i>Härkeberga</i> .
27	<i>Enköping</i> . Station on N. of town ; branch into town. For line from <i>Stockholm</i> to <i>Tillberga</i> , see Route 40. For line from <i>Gäfle</i> , see Route 75.

miles

- 42½ *Uppsala norra*. Line to Enköping branches (see above).
 49½ m. *Brunna*. 53½ m. *Åland*. 54½ m. Crosses the Tibbleå. 62 m. *Vittinge*. 66½ m. *Morgongåfva*.
- 70 **Heby**. For line from Runhällen to Enköping, see Route 75.
- 79½ **Sala**, alt. 170 ft.; silver mines. For line from Gäfle to Tillberga, see Route 75.
 85¾ m. *Brodabo*, after skirting lakes. 93¼ m. *Rosshyttan*. Forest region.
- 100 **Krylbo**, alt. 263 ft., on r. bank of the Dalälff. For Mjölby–Hallsberg–Krylbo line, see Route 37; for line from Tillberga, see Route 41; for line to Borrlänge, Insjön, and Rättvik, see Route 73.
 Long bridge over the Dalälff, seven spans.
- 102½ *Jularbo*.
- 105¼ **Fors**.
 Branch NW. to Grufgården:—3¾ m. *Åsgarn*, alt. 262 ft., near head of Vestansjön. 6¼ m. *Garpenbergbruk*, alt. 492 ft. 9¼ m. *Garpenberg*, alt. 556 ft. 11½ m. *Herrgården*. 12¾ m. *Dala-finnhyttan*. 14 m. *Grufgården*.
- 110¼ **Morshyttan**.
 Branch SE. to Näs (narrow gauge: 0·891 metre):—6¼ m. *Bredgrind*. 7½ m. *Näs*, on the Dalälff.
- 114 *Horndal*, iron works.
- 117 **Byvalla**.
 Branch NW. to Långshyttan (narrow gauge: 0·891 metre):—1¼ m. *Valla*. 4¼ m. *Lerhyttan*. 5½ m. *Åsbo*, on Simonsbosjön. 7¼ m. *Villingen*. 9¾ m. *Stjärnsund*, alt. 420 ft., at S. end of Lake Grychen. 11½ m. *Rörshyttan*. 12¾ m. *Västerby*. 16½ m. *Långshyttan*, alt. 354 ft., after skirting Bysjön and Lången.
- 124½ *Hästbo*.
- 128¾ **Torsåker**, alt. 222 ft.
 Branch SE. to Hammarby, on Eltebosjön, 3 miles.
- 134 Crosses Göteborg–Storvik line.

miles

135 **Storvik**, alt. 236 ft., on E. end of Näsbyggesjön. For line from Göteborg see Route 61; for line from Gäfle see Route 75.

On leaving, line crosses the Vallbyggeå.

139½ **Åshammar**, alt. 302 ft., after crossing the Storå.

144½ **Järbo**, alt. 328 ft. Leaving, line crosses the Jädraå on five-span bridge.

150 Alt. 394 ft.

159 **Ockelbo**, alt. 262 ft. For line from Gäfle see Route 76; for narrow-gauge line from Norrsundet to Linghed see Route 77.

165½ Alt. 420 ft.

169½ **Lingbo**, alt. 322 ft., after passing through low marshy country.

175½ **Holmsveden**, alt. 272 ft., on Härnebosjön.

181 Alt. 331 ft.

186 **Kilafors**, alt. 164 ft., on Bergviken, after crossing the Kilå.

miles

Branch E. to Söderhamn:—

0 **Kilafors**.

4½ **Landa**, after crossing the Ljusneälf.

7½ **Mobodarne**.

11 **Bergvik**, alt. 158 ft., on the Bergviken.

12½ **Myssje**.

14½ **Kinstaby**.

20 **Söderhamn**, seaport.

21½ **Stugsund** harbour.

Line runs near r. bank of the Ljusneälf.

190½ **Granbo**.

194½ Line from Mora joins, see Route 68.

196½ **Bollnäs**, alt. 187 ft. Line continues along series of linked lakes through which the Ljusneälf runs.

205½ **Arbrå**, alt. 371 ft.

208½ **Vallsta**, on Kyrksjön. Line skirts Orsjön.

212½ m. **Simeå**, alt. 387 ft. 219½ m. **Karsjö**, alt. 410 ft., on Tefsjön.

miles	
222 $\frac{1}{4}$	<i>Lörstrand</i> , on Tefsjön. Leaving, line crosses the Milå.
226 $\frac{1}{4}$	<i>Järsfö</i> , alt. 428 ft.
228 $\frac{3}{4}$	<i>Skästra</i> , after crossing isthmus between Bodasjön (W.) and the Ljusneälf.
230 $\frac{1}{2}$	Crosses the Ljusneälf.
232 $\frac{1}{4}$	Junction for line from Hudiksvall, after embankment through Hybosjön, see Route 78.
235	<i>Ljusdal</i> , alt. 430 ft.
239 $\frac{1}{4}$	<i>Tallåsen</i> , alt. 515 ft. Line leaves valley and ascends long embankment between lakes to
252 $\frac{1}{4}$	<i>Hennan</i> , alt. 693 ft., on Lake Hennan.
264 $\frac{3}{4}$	<i>Ramsjö</i> , alt. 690 ft., at end N. of lake. Steep ascent to alt. 1,082 ft.
275 $\frac{3}{4}$	<i>Mellansjö</i> , alt. 1,040 ft. Line descends
287	<i>Östavall</i> , alt. 794 ft., on Lake Aldern, which line skirts.
288 $\frac{3}{4}$	Crosses the Ljungaå.
292 $\frac{1}{2}$	<i>Alby</i> . Large electric works.
299 $\frac{1}{2}$	<i>Ånge</i> , alt. 551 ft. Line enters wild, wooded region.

miles	Branch to Sundsvall along Ljungaå :—
0	<i>Ånge</i> .
3	Crosses the Ljungaå, alt. 459 ft.
8 $\frac{1}{2}$	<i>Erikslund</i> . Leaving, line crosses the Ljungaå by bridge 177 ft. long.
12 $\frac{1}{4}$	<i>Johannisberg</i> . Branch to <i>Ljungavärk</i> , 2 miles.
17 $\frac{1}{4}$	<i>Fränsta</i> , on Torpsjön, alt. 259 ft.
23 $\frac{1}{4}$	<i>Torpshammar</i> , alt. 260 ft.
27 $\frac{1}{4}$	<i>Viskan</i> , alt. 207 ft.
33 $\frac{1}{2}$	<i>Stöde</i> , alt. 181 ft. River expands to form Stodensjön as far as
42 $\frac{3}{4}$	<i>Nedansjö</i> , alt. 181 ft.
47 $\frac{3}{4}$	<i>Vattjom</i> . Line leaves river. Branch to <i>Matfors</i> on river (narrow gauge, 1·067 metre) 2 miles.
51 $\frac{1}{2}$	<i>Töfva</i> , alt. 204 ft.
59	<i>Sundsvall</i> , seaport.

miles

- 308 *Dysjön*, alt. 952 ft., on Dysjöskallen.
- 318½ **Bräcke**, alt. 955 ft., on Refsunden after skirting several lakes. Marshy country.
- 319½ Line from Trondhjem joins, see Route 82.
- 326½ *Grötingen* halt. Leaving, line crosses Grötingensjön.
- 332 *Nyhem*, alt. 899 ft., on Mellsjön, after crossing stream.
- 340 *Dockmyr*, alt. 1,144 ft. Several small lakes.
- 344 *Gastsjön* halt, alt. 1,050 ft., on lake of same name.
- 352¼ *Kälarne*, alt. 971 ft., after skirting Ansjön.
- 359¾ *Håsjö*, alt. 865 ft., on Singsjön. Two short tunnels before
- 367¾ *Ragunda*, alt. 571 ft. Line follows the Singå valley and traverses tunnel, 135 yds. long, to
- 370¾ Bridge over the Indalsälf, 232 yds. long and 92 ft. above water.
- 375¼ *Bispgården*, alt. 571 ft. Line leaves river.
- 377¾ m. Crosses the Järå. 385 m. Crosses the Jämlå.
- 386¾ *Graninge*. Line skirts Ledingsjön and ascends the Ledingså valley.
- 393 *Helgum*, alt. 404 ft., at S. end of Helgumssjön. Line descends valley of the Faxälf.
- 399¼ **Långsele**, alt. 358 ft. For line from Härnösand and Sollefteå see Route 84.
- 399¾ Crosses the Faxälf.
- 403¾ *Österås*. Line ascends valley of Ångermanälf.
- 408¾ Five-arch bridge over Ångermanälf, 270 yds. long and 154 ft. above water, pillars granite and steel, upper portion steel.
- 411½ *Selsjön*, alt. 460 ft.
- 416 Crosses the Bjorkå.
- 418¾ m. Alt. 830 ft. 422¼ m. Alt. 866 ft.
- 425¾ *Aspeå* halt, near Aspsjön. Line descends Flärkä valley.

miles

- 428 Crosses the Barmå and skirts Byvattnet, Holmsjön, and Stugusjön.
- 434 $\frac{1}{4}$ Crosses the Flärkä.
- 436 $\frac{3}{4}$ *Skorped*, alt. 512 ft., after crossing the Onskanå.
- 441 $\frac{1}{4}$ Crosses Ufsjön on embankment 275 yds. long. Alt. 623 ft.
- 445 $\frac{3}{4}$ Alt. 747 ft.
- 448 Short tunnel, alt. 656 ft.
- 449 $\frac{1}{2}$ *Anundsjö*, alt. 578 ft.
- 455 **Mellansel**, alt. 210 ft. Leaving, crosses the Faxälf.

miles

Branch SE. to Örnsköldsvik :—

- 0 *Mellansel*. Line descends the Själevadså valley.
- 5 $\frac{1}{2}$ *Moälven*, alt. 158 ft.
- 7 $\frac{1}{4}$ Crosses the Själevadså.
- 13 $\frac{1}{2}$ *Själevad*.
- 17 $\frac{3}{4}$ Örnsköldsvik, seaport on Domsjöfjärden.

- 457 $\frac{1}{2}$ *Gottne*, alt. 289 ft.
- 458 $\frac{3}{4}$ Crosses the **Utterå**.
- 464 $\frac{1}{4}$ *Björnsjö* halt, alt. 443 ft., on Bjornsjön, which line crosses on embankment.
- 469 $\frac{3}{4}$ *Björna*, alt. 469 ft. Leaving, line crosses the Gideälf.
- 476 $\frac{1}{4}$ *Långviksman* halt, alt. 672 ft., after skirting Storsjön.
- 481 $\frac{1}{4}$ m. Alt. 685 ft. 484 m. Crosses the Huså.
- 484 $\frac{3}{4}$ m. *Trehörningsjö*, alt. 387 ft., on Lemelsjön.
- 486 $\frac{3}{4}$ m. Alt. 650 ft. 492 $\frac{3}{4}$ m. Crosses the Lögdeälf, alt. 456 ft. 496 $\frac{3}{4}$ m. Alt. 646 ft.
- 504 $\frac{1}{2}$ *Nyåker*, alt. 578 ft., after skirting several lakes and running along the Ledå valley.
- 507 Crosses the Öreälf by bridge 185 yds. long, 122 ft. above the water.
- 509 Tallborg tunnel, 145 yds. long, alt. 560 ft.
- 514 m. *Hörnsjö*, alt. 469 ft. 516 $\frac{3}{4}$ m. Crosses the Hornå. 519 $\frac{1}{2}$ m. Alt. 594 ft. 526 $\frac{1}{2}$ m. Crosses the Umeälf by bridge 198 yds. long.

miles

528 $\frac{1}{4}$ **Vännäs**, alt. 290 ft.

miles

Branch to Umeå along the Umeälf :—

0 *Vännäs.*3 $\frac{3}{4}$ *Spöland.*11 $\frac{1}{2}$ *Brännland*, alt. 199 ft.19 $\frac{1}{4}$ *Umeå*, seaport. Branch to wharves, 1 mile.24 $\frac{1}{4}$ *Storsandskär* harbour on island in river.536 $\frac{3}{4}$

Alt. 550 ft.

541 $\frac{3}{4}$ *Trvärälund*, alt. 584 ft.544 $\frac{3}{4}$

Alt. 610 ft., after skirting several small lakes.

546 $\frac{1}{2}$

Crosses the Vindelälf by iron bridge 200 yds. Runs near river.

549 $\frac{1}{2}$ *Vindelö*, alt. 570 ft.550 $\frac{3}{4}$ Branches NW. to river, $\frac{1}{4}$ mile, and NE. to *Abbertsjö*, $\frac{3}{4}$ mile.557 $\frac{3}{4}$ *Hällnäs*, alt. 801 ft. Leaves Vindelälf and crosses high plateau.563 $\frac{1}{4}$

Crosses the Jukså.

565

Yttersjön halt, alt. 794 ft.573 $\frac{1}{2}$ m. *Ekträsk*, alt. 843 ft. 583 m. Crosses the Sika. 584 $\frac{1}{4}$ m. *Ästräsk*, alt. 853 ft. 586 $\frac{3}{4}$ m. Crosses the Riså.599 $\frac{1}{2}$ **Bastuträsk**, alt. 797 ft.

miles

Branch E. to Skellefteå and Kallholmen :—

0 *Bastuträsk*. Line descends Skellefteälf valley.10 *Finnforstallet*.14 $\frac{1}{4}$ *Krångfors*.19 $\frac{3}{4}$ *Klutmark*.

21 Crosses the Skellefteälf.

23 *Medle*.28 $\frac{1}{4}$ *Skellefteå*.32 $\frac{3}{4}$ *Bergsholmen*.35 $\frac{3}{4}$ *Ursviken*.38 $\frac{1}{2}$ *Kallholmen*.611 $\frac{1}{2}$ *Kusfors* halt. After crossing the **Skellefteälf**, line rises to plateau.

miles

	612 $\frac{3}{4}$ m. Crosses the Pelikå.	616 $\frac{1}{4}$ m. Crosses the Sikå.
620 $\frac{1}{2}$	Jörn, alt. 856 ft. Leaving, line crosses Sik .	626 m. Alt. 987 ft. 638 m. Crosses the Ålså.
639 $\frac{1}{4}$	Crosses the Byskälf.	
640 $\frac{1}{4}$	Myrheden. Leaving, line crosses stream.	
642 $\frac{3}{4}$	Crosses the Byskälf.	
646 $\frac{3}{4}$	Långträsk, alt. 1,076 ft.	
649 $\frac{3}{4}$	Crosses the Abyälf and soon reaches summit of line,	
	1,155 ft.	
659	Crosses the Piteälf and passes S. end of Bänkerträsk.	
664 $\frac{1}{2}$	Crosses strait between Badstuträsk (W.) and Ers- träsk (E.)	
665 $\frac{1}{4}$	Storsund, alt. 666 ft. Leaving, line crosses Kalträsk.	
669 $\frac{3}{4}$	Crosses N. end of Stor Tenger, alt. 227 ft.	
679	Älfsby, alt. 128 ft.	

miles

Branch SE. to Piteå :—

0	Älfsby. Line descends valley of Piteälf.
9 $\frac{1}{4}$	Tvärån. Crosses the Piteälf before
17 $\frac{1}{4}$	Arneby.
26	Bölebyn.
29	Öjebyn.
32 $\frac{1}{4}$	Piteå, seaport.

680 m. Crosses the Piteälf. 683 $\frac{1}{4}$ m. Approaches Kroträsk.

691 $\frac{1}{4}$	Brännberg, alt. 292 ft.
702 $\frac{3}{4}$	Hednoret, alt. 72 ft., on Luleälf, wharf.
705 $\frac{1}{4}$	Crosses Luleälf.
707	Boden, alt. 33 ft.

miles

Branch SE. to Luleå :—

0	Boden.
.5	Säfvast, alt. 49 ft.
10 $\frac{1}{2}$	Sunderby, alt. 39 ft.
16 $\frac{3}{4}$	Gammelstad, alt. 19 ft.
22	Luleå, pop. 9,000, seaport.
22 $\frac{1}{2}$	Crosses strait.
22 $\frac{3}{4}$	Harbour of Svartö.

N. AND S.

B b

miles	
712	Line from Narvik and Gällivara joins, see Route 85. 717½ m. <i>Hundsjö</i> . 722½ m. Line approaches Lake Degersælet.
726¾	<i>Niemisel</i> , alt. 67 ft. 737¼ m. <i>Avafors</i> . 745¾ m. Crosses the Töreå. 752 m. <i>Morjärv</i> . 753¼ m. Crosses the Kalixälf.
771½	<i>Hvitvattnet</i> .
778¼	Crosses the Kukkasjoki, alt. 221 ft.
780	<i>Lappträsk</i> .
793	Karungi (Karl Gustav).
	miles .
	Branch N. to Öfver Torneå :—
0	<i>Karungi</i> . Line ascends r. bank of Torneälf.
5½	<i>Skogskärr</i> .
16	<i>Hedenäset</i> .
28	<i>Öfver Torneå</i> , alt. 208 ft.
809	Haparanda . Finnish railway station, Torneå, across Torneälf. Bridge under construction.

ROUTE 73

KRYLBO—BORLÄNGE—RÄTTVIK, 79 miles

0	Krylbo . Line runs NW.
¾	Line from Ängelsberg joins, see Route 41.
2½	<i>Avesta</i> , on the Dalälf, which line follows ; iron- works.
14½	<i>Hedemora</i> , alt. 351 ft. Line leaves the Dalälf. 17 m. <i>Skönsbo</i> halt, alt. 357 ft. 19¼ m. <i>Vikmans- hyttan</i> .
23½	Kullsveden . Branch to <i>Bispeg</i> iron mines, 2 miles.
25	<i>Säter</i> , alt. 515 ft., near Lake Ljustern.
29	<i>Solfvarbo</i> halt, alt. 440 ft. 31¾ m. <i>Gustafs</i> . 36 m. <i>Stora Tuna</i> .
40½	Borlänge , alt. 456 ft. ; cloth factories. For Göte- borg-Falun line, see Route 61.

miles

- 44½ **Repbäcken.** Line continues along narrowing valley. Junction of line from Falun to Björbo, see Route 61.
- 47 **Dufnäs**, immediately after crossing the **Dalälff**. Alt. 528 ft.
- 53½ **Djurås**, alt. 558 ft., near confluence E. and W. **Dalälff**.
- 56½ **Gagnev**.
- 61½ **Insjön**, on Insjön Lake. Line N. to pier, 2 miles.
- 64½ **Häradsbygden**.
- 67½ **Leksands-noret** after crossing the Östra **Dalälff**. 70½ m. **Leksboda**. 73 m. **Tällberg**.
- 76 **Tinaby**. Line skirts Lake Siljan.
- 77½ Line from Falun joins, see Route 61.
- 79 **Rättvik**. For line from Falun to Mora, see Route 61.

ROUTE 74

GÄFLE—UPPSALA, 69½ miles

- 0 **Gäfle**, south station; connected with central station; lines to wharves.
Branch NE. to Bomhus and Korsnas:—2½ m. *Bomhus* timber yards, lines to wharves. 4 m. *Korsnäs* sawmills.
- 1½ Alt. 79 ft. Line turns E.
- 6¾ **Furuvik**, alt. 39 ft.
- 9½ **Harnäs**, alt. 10 ft., seaport.
- 10½ **Skutskär**, seaport. Branch lines to harbour. Line turns S. by E.
- 16½ **Alfkarleö** on the **Dalälff**, salmon fishery.
Branch SW. up **Dalälff** to **Alfkarleö**, 1½ miles.
Leaving, line crosses the **Dalälff** by 6-arch bridge and viaduct, turns S. and ascends.
- 20 **Marma**.
- 27½ **Orrskog**, alt. 139 ft.

B h 2

miles

Branch NW. to *Unfraverket* on the Dalälff, 4 miles.Branch W. to *Söderfors* on the Dalälff, ironworks, $5\frac{1}{2}$ miles.Leaving, line turns SE. $32\frac{1}{2}$ m. *Tierp*. 33 m.Crosses the Tännareå. $40\frac{1}{2}$ m. *Tobo*. $43\frac{1}{2}$ m. *Örbyhus*.

44

Line turns S.

miles

Branch E. to *Dannemora* (standard gauge), $5\frac{1}{2}$ miles.Narrow-gauge line from *Dannemora* to *Hargshamn* (0.891 metre):—0 *Dannemora*. $1\frac{3}{4}$ *Österby*. $5\frac{1}{2}$ *Knaby*. (Branch S. to *Ramhäll*, 4 miles.) $13\frac{1}{4}$ *Gimo*. Leaving, line crosses the Olandså. $14\frac{3}{4}$ Branch S. to *Norrvällen* on Lake Vällen, $5\frac{1}{2}$ miles.21 *Harg*.24 *Hargshamn*.46 $\frac{1}{2}$ *Knypplan* (Vendel), alt. 101 ft.54 m. *Skyttorp*. 57 m. *Vattholmu*.58 $\frac{1}{4}$

Crosses the Fyriså and ascends valley.

 $62\frac{1}{4}$ m. *Storvreta*. $67\frac{1}{4}$ m. *Gamla Uppsala*.69 $\frac{3}{4}$ **Uppsala**. For line from Stockholm to Krylbo and Boden and branch to Enköping, see Route 72; for narrow-gauge line from Norrtälge, see Route 71.

ROUTE 75

GÄFLE—SALA—TILLBERGA, 83 miles

0

Gäfle, central station, connected with south station; lines to wharves.

1

Line to Ockelbo branches, see Route 76.

3 $\frac{3}{4}$ **Hagaström**.

miles

Branch SW. to *Storvik*:—0 *Hagaström*. $2\frac{1}{4}$ *Valbo*. Line ascends the Gäflea valley. $4\frac{3}{4}$ *Håbō* halt

miles	miles	
		Branch SE. to <i>Mackmyra</i> across the Gäflea, $1\frac{1}{2}$ miles, and to <i>Mackmyra</i> pulp works, $1\frac{1}{4}$ miles.
	$6\frac{1}{2}$	<i>Forsbacka</i> , alt. 209 ft.
		Branch S. to <i>Forsbacka</i> on <i>Storsjön</i> , $1\frac{1}{4}$ miles.
	$9\frac{1}{4}$	Crosses the <i>Jadraå</i> .
	$10\frac{3}{4}$	<i>Sandviken</i> on <i>Storsjön</i> .
	16	<i>Kungsgården</i> , alt. 221 ft., on <i>Storsjön</i> .
	$19\frac{1}{2}$	<i>Storvik</i> , alt. 236 ft. For line from Stockholm and Uppsala to Ockelbo and Boden, see Route 72; for line from Göteborg and Falun, see Route 61.
$6\frac{1}{4}$		<i>Sveden</i> .
8		<i>Mackmyra</i> . No connexion with branch from Håbö above.
$11\frac{3}{4}$		<i>Rörberg</i> , alt. 230 ft., on <i>Valsjön</i> .
13		Alt. 262 ft. Line descends slowly.
$17\frac{1}{2}$		<i>Främlingshem</i> , alt. 239 ft.
	$25\frac{1}{2}$ m.	<i>Hedesunda</i> . $29\frac{3}{4}$ m. <i>Smedsäng</i> .
$32\frac{3}{4}$		<i>Gysinge</i> . Leaving station, line crosses the wide <i>Dalälff</i> .
	$37\frac{3}{4}$ m.	<i>Kerstinbo</i> . 44 m. <i>Tärnsjö</i> . $50\frac{1}{4}$ m. <i>Råsbo</i> .
$55\frac{1}{4}$		Runhällen.
		Branch SE. to <i>Enköping</i> :— $6\frac{1}{4}$ m. <i>Heby</i> . (For line from Uppsala to <i>Sala</i> , see Route 72.) $11\frac{1}{4}$ m. <i>Hårsbäck</i> . $13\frac{1}{4}$ m. <i>Altuna</i> . 18 m. <i>Fjärdhundra</i> . $20\frac{1}{2}$ m. <i>Frösthult</i> . $24\frac{1}{4}$ m. <i>Sparrsätra</i> . $29\frac{1}{4}$ m. <i>Enköping</i> . (For line from Stockholm to <i>Tillberga</i> , see Route 40.)
	$59\frac{1}{2}$ m.	<i>Jugansbo</i> . $62\frac{1}{2}$ m. <i>Saladamm</i> .
$66\frac{3}{4}$		Sala , alt. 170 ft., silver and lead mines. For line from Stockholm and Uppsala to <i>Krylbo</i> and <i>Boden</i> , see Route 72.
	72 m.	<i>Tärna</i> . 73 m. <i>Ransta</i> .
	76 m.	Crosses the <i>Ranstaå</i> . 80 m. <i>Hedensberga</i> .
83		Tillberga . For line to <i>Ludvika</i> , see Route 41, and for line from Stockholm to <i>Köping</i> and <i>Frövi</i> , see Route 40.

ROUTE 76

GÄFLE—OCKELBO, 24 miles

miles	
0	Gäfle , north station, connected with south station.
$\frac{1}{2}$	Line to Sala, Tillberga, and Storsvik branches off, see Route 75.
$2\frac{1}{4}$	<i>Strömsbro</i> . Line ascends Testeboå valley.
$5\frac{1}{2}$	<i>Åbyggeby</i> , alt. 105 ft.
$8\frac{1}{2}$	<i>Brännsågen</i> halt, alt. 202 ft. Leaving, line crosses the Testeboå.
11	<i>Oslättfors</i> , alt. 225 ft.
	14 m. <i>Råhällen</i> . $15\frac{1}{4}$ m. Alt. 289 ft. Line descends slowly.
18	<i>Kolforsen</i> . Leaving, line crosses the Testeboå.
24	Ockelbo , alt. 262 ft., after skirting Lake Yklaren. For Stockholm—Uppsala—Boden line, see Route 72; for narrow-gauge line from Norrsundet to Linghed, see Route 77.

ROUTE 77

NORRSUNDET—LINGHED (narrow gauge: 0.891 metre),
53 $\frac{1}{4}$ miles

0	Norrsundet . Seaport. Line skirts Hamrångefjord.
$3\frac{3}{4}$	<i>Åbydal</i> , after crossing the Hamrangeå. Line ascends.
	$9\frac{3}{4}$ m. <i>Vittersjö</i> , alt. 243 ft., on Vittersjön. $13\frac{3}{4}$ m. <i>Östby</i> , alt. 275 ft., on Östersjön.
$16\frac{1}{2}$	Ockelbo , alt. 262 ft., after crossing main line to north (see Route 72) and the Testeboå.
$17\frac{1}{4}$	For line from Gäfle, see Route 76.
$18\frac{1}{4}$	Line runs S. near main line, crosses stream and turns SW.
20	<i>Brattfors</i> , alt. 416 ft. Leaving, line turns W. and skirts Öfver Mångala Lake.

miles	
27	<i>Jädraås</i> , alt. 663 ft. Line ascends the <i>Jädraå</i> valley NW.
29½	<i>Tallås</i> , alt. 665 ft. Leaving, line crosses the <i>Jädraå</i> and ascends the <i>Lillå</i> valley to W. 34½ m. <i>Svarbäcken</i> . 40 m. <i>Lilla Björnmossen</i> .
42½	<i>Ryssjön</i> , on <i>Ryssjön</i> . Line turns SW.
46½	Vintjärn , alt. 1,148 ft. Iron mines.
miles	Branch S. to Hinsén :—
0	<i>Vintjärn</i> .
5	<i>Åg</i> , alt. 847 ft., after crossing end of <i>Ågsjön</i> .
13½	<i>Hinsén</i> , alt. 630 ft., on Lake Hinsén, thence navigable lake to <i>Korsa</i> , 14 miles.
53½	Linghed , alt. 459 ft., on <i>Svardsjön</i> .

ROUTE 78

HUDIKSVALL—LJUSDAL, 38½ miles

0	Hudiksvall , seaport.
7½	<i>Forsa</i> , alt. 111 ft., on <i>Kryksjön</i> .
10½	<i>Näsviken</i> . Line skirts <i>Södra Dellen</i> ; two tunnels before.
19	<i>Fredriksfors</i> , alt. 226 ft. Line runs along Lake <i>Dellen</i> .
21½	<i>Delsbo</i> , alt. 240 ft. Line skirts several lakes.
25	<i>Långbacka</i> .
34½	<i>Hybo</i> , alt. 404 ft.
35½	Joins main line Stockholm to north, see Route 72.
38½	Ljusdal , alt. 430 ft., on above line.

ROUTE 79

HUDIKSVALL—BERGSJÖ (narrow gauge: 0·891 metre), 24 miles

0	Hudiksvall .
4½ m.	<i>Rogsta</i> . 7½ m. <i>Via</i> , alt. 79 ft. 15½ m. <i>Harmånger</i> , alt. 102 ft. 18½ m. <i>Hånick</i> , on <i>Storsjön</i> , which line skirts. 21 m. <i>Högen</i> .
24	Bergsjö , alt. 173 ft.

ROUTE 80

ÖLAND RAILWAYS (narrow gauge : 0.891 metre)

BORGHOLM—BÖDA, $34\frac{1}{4}$ miles

miles

0	Borgholm. Line runs E.
$2\frac{1}{2}$	<i>Tingsdal</i> , alt. 67 ft.
$4\frac{1}{4}$	<i>Öjkroken</i> , alt. 67 ft. Line turns N. along middle of island.
	$5\frac{1}{4}$ m. <i>Kalleguta</i> . $7\frac{3}{4}$ m. <i>Dalbyro</i> , alt. 73 ft.
	9 m. <i>Alböke</i> . $10\frac{3}{4}$ m. <i>Stacketorp</i> . $14\frac{1}{2}$ m. <i>Uggletorp</i> , alt. 31 ft.
	$16\frac{1}{4}$ m. <i>Föra</i> , alt. 15 ft. 18 m. <i>Persnäs</i> , alt. 11 ft.
	21 m. <i>Gunnarslund</i> , alt. 30 ft. $23\frac{1}{2}$ m. <i>Källaberg</i> , alt. 29 ft.
	$27\frac{1}{4}$ m. <i>Löttorp</i> . $30\frac{1}{4}$ m. <i>Vedborm</i> . $32\frac{1}{2}$ m. <i>Skäftekärr</i> .
$34\frac{1}{4}$	Böda , alt. 21 ft.

BORGHOLM—FÄRJESTABEN, $26\frac{1}{2}$ miles

0	Borgholm. Line runs S.
	3 m. <i>Räpplinge</i> . $4\frac{3}{4}$ m. <i>Ölands Lindby</i> , alt. 65 ft.
	$7\frac{1}{4}$ m. <i>Gärdslösa</i> , alt. 72 ft. $9\frac{3}{4}$ m. <i>Långlöt</i> , alt. 59 ft.
	$13\frac{1}{2}$ m. <i>Runsten</i> , alt. 53 ft. 16 m. <i>Norra Möckleby</i> .
	19 m. <i>Gårdby</i> , alt. 46 ft. Line turns NW. $24\frac{1}{2}$ m. <i>Skogby</i> .
	$25\frac{1}{2}$ m. Line to S. branches, see below.
$26\frac{1}{2}$	Färjestaben. Ferry port for Kalmar.

FÄRJESTABEN—OTTENBY, 32 miles

0	Färjestaben.
	1 m. Line from Borgholm joins and line turns S.
	4 m. <i>Vickleby</i> .
9	Mörbylånga. Small seaport.
$15\frac{1}{4}$	<i>Kastlösa</i> . Line crosses island to SE.
	$20\frac{1}{2}$ m. <i>Skärölf</i> . $23\frac{1}{2}$ m. <i>Segerstad</i> . 26 m. <i>Torngård</i> , alt. 31 ft.
	$27\frac{3}{4}$ m. <i>Gräsgård</i> .
32	Ottenby , alt. 28 ft.

ROUTE 81

GOTLAND RAILWAYS (narrow gauge: 0·891 metre)

VISBY—TINGSTÄDE, $14\frac{3}{4}$ miles

miles

0	Visby. Line runs NE. Branch to pier.
$6\frac{3}{4}$	<i>Västkinde</i> , alt. 161 ft.
$10\frac{1}{2}$	<i>Martebo</i> .
$14\frac{3}{4}$	Tingstäde , alt. 169 ft., on Tingestädeträsk.

VISBY—BURGSVIK, 49 miles

0	Visby. Line runs SE. Branch to pier.
$8\frac{1}{4}$	<i>Barlingbo</i> , alt. 118 ft. Bogs to E. of line.
$13\frac{1}{4}$	Roma. Bogs to E. of line. Junction for Slite-Klintehamn line, see below. Line traverses boggy country from here southward.
	17 m. <i>Bjärges</i> . Line turns S. $19\frac{3}{4}$ m. <i>Buttle</i> .
	$24\frac{3}{4}$ m. <i>Etelhem</i> , alt. 141 ft. $28\frac{3}{4}$ m. <i>Stånga</i> .
$33\frac{3}{4}$	Hemse.
	Branch SE. to Ronehamn:— $3\frac{1}{2}$ m. <i>Autsarfve</i> , alt. 80 ft. $5\frac{1}{4}$ m. <i>Mattsarfve</i> , alt. 46 ft. $7\frac{1}{2}$ m. <i>Ronehamn</i> . Small seaport.
$39\frac{3}{4}$	<i>Hafdhem</i> , alt. 78 ft.
$44\frac{3}{4}$	<i>Fidenäs</i> halt, alt. 29 ft., at head of Burgsviken.
49	Burgsvik. Small seaport.

SLITE—KLINTEHAMN, $34\frac{3}{4}$ miles

0	Slite. Small seaport. Line runs S. over narrow isthmus between Sjuströmmar (E.) and Bogevisken (W.), and turns SW. through swampy region.
	8 m. <i>Bäl</i> , alt. 128 ft. $9\frac{1}{2}$ m. <i>Larsarfve</i> . $10\frac{3}{4}$ m. <i>Källunge</i> . $12\frac{1}{2}$ m. <i>Simunde</i> . 15 m. <i>Dune</i> . $16\frac{1}{2}$ m. <i>Hässelby</i> . 18 m. <i>Tule</i> .
$20\frac{3}{4}$	Roma. For line from Visby to Burgsvik, see above.
	$24\frac{1}{2}$ m. <i>Isums</i> , alt. 111 ft. $25\frac{3}{4}$ m. <i>Hogrän</i> .
	$27\frac{1}{4}$ m. <i>Bander</i> , alt. 125 ft. $28\frac{3}{4}$ m. <i>Skogs</i> . 30 m. <i>Tjuls</i> . $31\frac{3}{4}$ m. <i>Sanda</i> , alt. 65 ft.
$34\frac{3}{4}$	Klintehamn. Small seaport.

VISBY—HALLVÅRDS, 5 $\frac{3}{4}$ miles

miles

0	Visby. Line runs near coast.
1 $\frac{1}{4}$	<i>Södervärn.</i>
4	<i>Kneippby</i> , bathing resort.
5 $\frac{3}{4}$	Hallvårds (Bjärs).

ROUTE 82

TRONDHJEM—BRÄCKE, 211 miles

0	Trondhjem , Merakerbanen station. Line leaves Trondhjem E. by a swing bridge over the mouth of the Nidelv.
1 $\frac{1}{2}$	<i>Leangen</i> halt, alt. 111 ft. Line skirts Trondhjem fjord.
4 $\frac{1}{4}$	<i>Ranheim</i> , alt. 33 ft., after crossing the Vikselv on bridge 33 ft. long.
9 $\frac{1}{4}$	<i>Malvik</i> , alt. 26 ft.
14 $\frac{1}{4}$	<i>Hommelvik</i> , alt. 26 ft. Leaving, line crosses the Holma by bridge 94 yds. long.
19 $\frac{3}{4}$	Hell , alt. 10 ft., on Stjördsalselv, which line follows. For line N. to Sunnan, see Route 87.
26	<i>Hegre</i> , alt. 59 ft.
28 $\frac{1}{2}$	Passes mouth of the Forra flowing from NE.
31 $\frac{1}{2}$	Crosses the Sona by two-span iron bridge 30 yds. long, 23 ft. above water level.
35 $\frac{1}{4}$	<i>Floren</i> , alt. 131 ft.
43 $\frac{3}{4}$	Crosses the Guda by a one-span iron bridge 40 ft. long and 16 ft. above water level.
44 $\frac{1}{4}$	Gudaaen , alt. 278 ft. Leaving, line crosses Stjördsalselv by a four-span iron bridge 96 yds. long and 20 ft. above water level, and continues to ascend by r. bank, traversing Volden tunnel, 100 yds. long.
48 $\frac{1}{4}$	Crosses the Funna by a four-span iron bridge 60 yds. long and 66 ft. above water level.
49 $\frac{3}{4}$	Meraker , alt. 722 ft. Norwegian customs house. Line ascends Tevldalen.

miles

- 54½ **Kopperaaen.** Crosses the Koppera by bridge 60 ft. long and 20 ft. above river.
- 60½ Crosses the Skurdalsa by lattice-work girder bridge 46 ft. long and 27 ft. above river level.
- 63 Crosses the Norwegian-Swedish frontier, alt. 1,824 ft. Timber snow-sheds along this part of the line. Country bare.
- 66½ **Storlien**, alt. 1,492 ft. Swedish customs house. Carriages generally changed. Line passes in view of Visjön to N.
- 74½ *Enafors*, alt. 1,818 ft., on Enaälf. Long snow-sheds.
- 81½ *Änn*, alt. 1,762 ft., on Ännsjön, after swampy ground to r.
- 85½ Crosses the Ännälf and skirts Gefsjön.
- 88 *Gefsjön*, alt. 1,664 ft.
- 93 Reaches the Dufedsälf valley and descends through forest region.
- 96 *Dufed*, alt. 1,263 ft., after crossing the Dufedsälf. Line skirts Åresjön to
- 101 *Åre*, alt. 1,240 ft. and
- 109½ *Undersåker*, alt. 1,237 ft.
- 112 *Hålland* halt, on Dufedsälf, which line follows to
- 116½ *Hjärpen*, alt. 1,067 ft., after crossing wide Hjärpsström on embankment.
- 122 *Mörsil*, alt. 1,080 ft., after skirting Litensjön. Line descends valley to Indalsälf to
- 125½ *Ocke* halt, on Ockesjön. Line leaves valley and ascends.
- 132½ *Mattmar*, alt. 1,014 ft.
- 135 Alt. 1,158 ft. Line descends.
- 139 *Trångsviken*, alt. 967 ft.
- 144½ *Ytterån*, alt. 978 ft., after crossing the Ytterå.
- 149½ *Näliden*, alt. 1,001 ft., on the Faxälf. Leaving, line skirts Nälidensjön.
- 154½ *Krokum*, alt. 984 ft. Leaving, line crosses the Indalsälf and skirts Åssjön, a branch of Storsjön.

miles

- 161 *Tång*, alt. 1,030 ft. on Åssjön. Line continues along Assjön and Östersund to
- 167½ **Östersund**, alt. 971 ft. Road bridge over sound. For line NE. to Dorotea, see Route 83.
- 176¾ *Brunflo*, alt. 1,073 ft., lies 100 ft. above Östersund Lake.
- Branch S. to Skanderåsen :—0 m. *Brunflo*. 5 m. *Angsta*. Line rises and then descends. 16 m. *Fähren* (*Näs*) on Näckten. 20 m. *Hackås* on Storsjön, which line skirts. 31 m. *Skanderåsen* halt on Bergsvand, a gulf of Storsjön. Line under construction up valley to 42 m. *Asarne*, and farther south.
- 179¼ *Lockne* halt, alt. 1,112 ft. at N. end of Locknesjön.
- 187¾ *Pilgrimstad*, alt. 955 ft., at N. end of Anviksjön. Line winds along shore of Anviksjön and Refsundsjön. to
- 196¼ *Gällö*, alt. 955 ft., at N. end of Refsundsjön. Leaving line crosses strait and skirts E. side of Refsundsjön.
- 204¼ *Stafre*, alt. 948 ft.
- 206 Crosses the Gimå.
- 211 **Bräcke** alt. 955 ft., on Refsundsjön. For line from Stockholm to Boden and Haparanda, see Route 72.

ROUTE 83

ÖSTERSUND—DOROTEA—VILHELMINA, 151 miles

- 0 **Östersund**, alt. 971 ft. Line runs N.
- 8 *Åskott*, alt. 1,115 ft.
- 17¼ *Lit*, alt. 860 ft., after crossing the Indalsälf and the Långåå. Leaving, line crosses the Hårkaå and ascends its valley.
- 23½ m. *Hägenås*. 27¾ m. *Norderåsen*. 38¼ m. *Munkflohögen*.
- 49¼ **Jämtlands Sikås**, alt. 1,076 ft.
- Branch SE. to *Hammerdal*, 5½ miles, on Hammerdalsjön.
- 60¾ *Hallviken*, alt. 1,079 ft. Line skirts Hallviken and Russfjärden and crosses the Faxälf to

miles

71½	Ulriksfors , alt. 938 ft. Branch W. to <i>Strömsund</i> , 2½ miles, at head of <i>Russfjärden</i> .
83¾	<i>Löoberga</i> , alt. 886 ft., at S. end of <i>Flåsjön</i> .
96¾	Crosses the <i>Flåsjöå</i> and the <i>Tåsjöälf</i> after passing several lakes.
103½	<i>Hoting</i> , after skirting <i>Hotingsjön</i> .
108½	Crosses <i>Rörströmsjön</i> .
116½	Dorotea , alt. 1,080 ft., after crossing the <i>Bergvallenå</i> . Line beyond <i>Dorotea</i> not open in October 1916, but apparently built.
119	Crosses the <i>Fjällå</i> . 121½ m. <i>Saxvattnet</i> , alt. 1,109 ft. 126½ m. Crosses the <i>Stamsjöå</i> .
129	<i>Granberget</i> .
136½	<i>Meseleforsen</i> , alt. 1,082 ft., after crossing the wide <i>Ångermanälf</i> . Line skirts <i>Råselet</i> to
145¼	<i>Volgsjöfors</i> , alt. 1 092 ft., on <i>Volgsjön</i> .
151½	Vilhelmina , alt. 1,303 ft., on <i>Volgsjön</i> , after crossing the <i>Vojmå</i> .

ROUTE 84

HÄRNÖSAND—LÅNGSELE, 72 miles

0	Härnösand . Line skirts <i>Älandsfjord</i> . 5 m. <i>Älandsbro</i> . Rapid ascent. 11½ m. <i>Oringen</i> . Tunnel.
11¾	Two tunnels. Line descends and approaches river.
16	<i>Veda</i> . Line ascends valley of the <i>Ångermanälf</i> . 18½ m. <i>Ramvik</i> . 22 m. <i>Sprängsviken</i> . 25¾ m. <i>Frånö</i> . 28¼ m. <i>Kramfors</i> . 29¼ m. Branch to river, ½ mile. 31¾ m. <i>Dynäs</i> . <i>Bollstabruk</i> . Line skirts <i>Bollstafsjön</i> .
34¾	Nyland . Important seaport.
38½	44 m. <i>Prästmon</i> . 52 m. <i>Lökom</i> . 55 m. <i>Gårdnäs</i> . 58¾ m. <i>Multrä</i> . 61¼ m. <i>Övergård</i> .
63½	Sollefteå , alt. Private line ends ; state line begins;

miles

- 66½ Branch to river, 1¼ miles.
 68 Line leaves the Ångermanälf and ascends the Faxälf valley.
 72¼ **Långsele**, alt. 358 ft. For Stockholm, Uppsala, Boden, Haparanda line, see Route 72.

ROUTE 85

NARVIK—BODEN, 271 miles

This line is single tracked but the number of crossings has lately been increased in order to facilitate the ore traffic. It is electrified from the Swedish frontier station to Kiruna.

- 0 **Narvik** station, alt. 152 ft. Lines from iron-ore wharves at N. of Victoria Haven (Narvik Bay), 1 mile, and from **Fagernes** on S. side of bay, 2¼ miles. Line skirts Rombaksfjord, and ascends rapidly and passes through three short tunnels to
 2½ *Dybvik* crossing place, alt. 334 ft. Tötta Mts. to S. Two short tunnels.
 6¼ *Strömsnes* halt, alt. 581 ft. Short tunnel on leaving.
 10½ *Sildvik* crossing place, alt. 871 ft., after tunnel of 450 yds.
 14 Middag tunnel, 568 yds. long, after two short tunnels.
 15½ *Hundalen* halt, alt. 1,240 ft., after covered snow-sheds.
 Line now enters most difficult part of its course. Turns S. and enters a tunnel 350 yds. long.
 16¼ Crosses the Hundalselv, which runs in a conduit under line. Line turns N. up E. side of Norddal. Snow-sheds.
 19 Crosses Norddal after three tunnels. Viaduct 200 yds. long and 130 ft. above the Norddalselv, and turns eastward round end of Norddal, passing through four short tunnels.

miles	
20 $\frac{3}{4}$	Alt. 1,712 ft.
23	Crosses the frontier after more windings.
23 $\frac{1}{2}$	Riksgränsen , alt. 1,706 ft. Swedish frontier station: water for locomotive pumped from lake. Line electrified to Kiruna.
27 $\frac{3}{4}$	<i>Vassijaure</i> , alt. 1,683 ft., after tunnel of 650 yds.
34 $\frac{1}{2}$	<i>Kopparåsen</i> , alt. 1,446 ft. On leaving, line passes through Tornehamn tunnel, 589 yds. long.
40	<i>Björkliden</i> , alt. 1,374 ft., on Torneträsk, which line skirts.
	Crosses the Låktajokk on high viaduct and passes through Nuolja tunnel, 963 yds. long.
43 $\frac{3}{4}$	<i>Abiskojokk</i> halt, alt. 1,296 ft. Tourist station.
45 $\frac{1}{2}$	<i>Abisko</i> , alt. 1,273 ft. Crossing place; coal store.
51 $\frac{3}{4}$	<i>Stordalen</i> , alt. 1,256 ft.
59 $\frac{1}{4}$	<i>Kaisepakte</i> , alt. 1,286 ft.
65 $\frac{1}{2}$	<i>Stenbacken</i> , alt. 1,243 ft.
71 $\frac{3}{4}$	<i>Torneträsk</i> , alt. 1,290 ft. Line turns SE. away from lake.
78 $\frac{1}{2}$	<i>Bergfors</i> , alt. 1,614 ft.
84	<i>Rensjön</i> , alt. 1,605 ft.
90	<i>Rautas</i> , alt. 1,534 ft.
96	<i>Krokvik</i> , alt. 1,521 ft.
102 $\frac{1}{2}$	Kiruna , alt. 1,657 ft. Iron mines and works; several branch lines to mines. Electric line ends.
111	<i>Kalixfors</i> , alt. 1,520 ft. Leaving, line crosses the Kalixälf.
128 $\frac{1}{2}$	<i>Fjällasen</i> , after crossing the Kaitamaälf.
136	<i>Harrå</i> halt, alt. 1,828 ft.; summit of line.
144	<i>Risbäck</i> .
158 $\frac{1}{4}$	<i>Siktrask</i> , alt. 1,293 ft.
164 $\frac{1}{2}$	Gällivara , alt. 1,178 ft. Road to Haparanda.

Branch N. to *Malmberget*, alt. 1,375 ft., for iron mines, 3 $\frac{1}{4}$ miles.

Branch NE. to *Koskulls-Kulle* mineral springs, 5 $\frac{1}{4}$ miles.

Branch SW. to *Porjus*:—16 m. *Kuosakäbbo*. 28 $\frac{1}{2}$ m. *Luleluspén*.

33 $\frac{1}{2}$ m. *Porjus*, alt. 1,188 ft.: electric works.

miles	
177½	<i>Ripats</i> halt, alt. 1,368 ft.
183¾	<i>Nuortikon</i> halt, alt. 1,214 ft.
194½	<i>Nattavara</i> , alt. 1,057 ft., after crossing the Råneälf.
	Road to Haparanda.
201¾	<i>Koskivara</i> halt.
206	Crosses the Kaipajokki.
207¾	<i>Polcirkeln</i> , alt. 1,020 ft. Half mile north of Arctic Circle.
215½	<i>Murjek</i> , alt. 791 ft. Road to Jokkmokk (p. 236) and Luleå.
225	<i>Näsberg</i> halt.
232½	<i>Lakaträsk</i> , alt. 551 ft.
238¾	<i>Gullträsk</i> halt.
245	<i>Sandträsk</i> , alt. 551 ft.
259½	<i>Ljuså</i> , alt. 92 ft.
266½	Joins line from Stockholm to Haparanda, see Route 72.
271½	<i>Boden</i> , alt. 33 ft.

ROUTE 86

THAMSHAVN—LÖKKEN (narrow-gauge electric), 15½ miles

0	Thamshavn. Large quay space.
½	<i>Orkedalsören.</i> Line ascends r. bank of the Orkla.
	4¼ m. <i>Fandrem.</i> 8 m <i>Solbusøy</i> halt. 11¾ m. <i>Svorkmo.</i>
15½	Lökken , alt. 541 ft. ; copper mines.

ROUTE 87

HELL—SUNNAN, 65 miles

0	Hell , alt. 10 ft. Leaving, line crosses the Stjördalselv by a five-span iron bridge, each span 38 yds. long.
1¾	<i>Stjördalen</i> , alt. 23 ft. ; fishing village.
2¼	Crosses the Gra by an arched bridge 52 ft. long.
6	<i>Skatval</i> , alt. 218 ft.

miles

- 8½ *Alstad* crossing-place, alt. 296 ft. Line descends rapidly.
- 11½ *Langstein* halt, alt. 26 ft., on Aasenfjord. Line rises and falls again slightly.
- 17¾ *Aasen*, alt. 233 ft., on Hammervand. Leaving, line crosses the Fossing by an arched bridge 52 ft. long.
- 23¼ *Ronglan*, alt. 204 ft., after a tunnel 48 yds. long.
- 27 *Skogn*, alt. 164 ft. Line continues near Hjemsfjord.
- 32 *Levanger*, alt. 10 ft., pop. 1,600, after crossing the Levanger by a single-span bridge 28 yds. long. Small manufacturing town on Hjemsfjord. Line continues near fjord.
- 37 *Rinnan*, alt. 52 ft.
- 39½ *Vaerdalen*, alt. 23 ft., after crossing Vaerdalselv by a six-span bridge, each span 38 yds. long. Line continues near fjord.
- 45 *Salberg*, alt. 170 ft., after skirting fjord and traversing tunnel 93 yds. long through slopes of Kubjör-gen. Line leaves fjord and traverses tunnel 420 yds. long.
- 50 *Sparbu*, alt. 105 ft.
- 53¾ *Vist* halt, alt. 65 ft. Line reaches Beitstadfjord.
- 54¾ Crosses the Figga by two-span pile bridge 25 yds. long.
- 58¼ *Stenkjaer*, alt. 13 ft. Harbour; line to quay. Leaving, line crosses the Stenkjaerelv by iron two-span bridge 52 yds. long, and ascends r. bank of the Byelv, skirts Reinsvand and Fossumvand to
- 65 *Sunnan*, alt. 98 ft., on Snaasenvand. Locomotive sheds, turn-table, and coal store.
Line being continued to Sem and Namsos.

ROUTE 88

TRONDHJEM—KRISTIANIA, 348 miles

This line is narrow gauge (1·067 metre) from Trondhjem to Hamar and thence standard gauge to Kristiania.

miles

0

Trondhjem. Merakerbanen station, alt. 10 ft. Line runs W. and crosses iron swing bridge, traverses small island, crosses second iron swing bridge to

 $\frac{1}{2}$

Skansen halt, alt. 13 ft.

Branch W. along Trondhjemfjord to *Fagervik*, $1\frac{1}{4}$ miles.

After tunnel 200 yds. long, under suburb of Ilen, line ascends l. bank of Nidelv.

 $3\frac{1}{2}$

Selsback, alt. 170 ft., after short tunnel. Line leaves the Nidelv.

12

$6\frac{1}{2}$ m. *Heimdal*, alt. 463 ft. 9 m. *Nypan*, alt. 230 ft.

Melhus, alt. 76 ft. Line ascends r. bank of the Gula.

 $19\frac{1}{4}$

$14\frac{1}{2}$ m. *Söberg*, alt. 102 ft. $16\frac{1}{4}$ m. *Kvaal*, alt. 161 ft.

Ler, alt. 79 ft., after crossing arm of the Nidelv twice.

23

Lundemo, alt. 108 ft., after crossing the Lunda-soknaelv by bridge 66 yds. long.

 $26\frac{3}{4}$

Hovind, alt. 174 ft., after crossing the Gula by bridge 225 yds. long.

31

Stören, alt. 210 ft. Leaving, line crosses the Gula by bridge 228 yds. long with 23 spans, and 14 ft. above the water level. Line ascends r. bank of the Gula.

 $37\frac{3}{4}$

Rognaes, alt. 315 ft. Three tunnels before

 $45\frac{3}{4}$

Björgeren, alt. 482 ft.

 $48\frac{3}{4}$

Crosses the Sevilla by bridge 17 yds. long.

 $49\frac{1}{4}$

Singsaas, alt. 578 ft. Road bridge over the Gula.

53

Crosses the Holteneelv by bridge 18 yds. long.

$54\frac{1}{4}$ m. *Reitstöen*, alt. 673 ft. $59\frac{3}{4}$ m. *Langletet*, alt. 774 ft.

 $63\frac{3}{4}$

Crosses the Holteneelv by bridge 34 yds. long.

miles

- 66½ *Holtaalen*, alt. 988 ft.
- 69 Crosses the Dröia by bridge 141 yds. long.
- 74 *Eidet*, alt. 1,380 ft., after seven short tunnels, of which longest is 220 yds.
- 80½ *Reitan*, alt. 1,774 ft., after tunnel. Copper mine.
- 81½ Crosses the Gula by bridge 100 yds. long of 7 spans.
- 84½ *Vongrav* tunnel, 40 yds. long.
- 86½ **Tyvold**, alt. 2,180 ft., at head of Rugla valley: summit of line.
Branch S. to *Kongens Grubbe* copper mine, alt. 2,808 ft., 6 miles.
- 92 *Jensvold*, alt. 2,093 ft., after passing several small lakes.
Leaving, line crosses the Glommen by bridge 69 yds. long and descends by l. bank of Glommen in narrow valley.
- 95½ *Nypladsen* halt, alt. 2,057 ft.; copper mining.
- 99½ Branch E. to **Röros**, alt. 2,060 ft., 2½ k.; copper-mining centre on the Hitterelv.
- 100 Crosses the Haaelv by bridge 75 yds. long.
- 106 Crosses the Noraelv.
- 107 *Os*, alt. 1,976 ft., after crossing the **Verjaa**.
- 117 *Tolgen*, alt. 1,782 ft.
- 123½ *Telneset*, alt. 1,634 ft., after crossing the **Telaelv**.
- 130 *Tönset*, alt. 1,620 ft., on 'cut off' of the Glommen.
- 136½ *Auma*, alt. 1,598 ft. Leaving, crosses the **Aumaälf**.
- 144½ *Lille Elvedal*, alt. 1,660 ft. Road bridge over the Glommen.
- 157½ m. *Barkald*, alt. 1,487 ft. 170 m. *Hanestad*, alt. 1,254 ft.
- 178½ m. *Atna*, alt. 1,170 ft. 185 m. *Björaaneset* halt.
- 195 195 m. *Koppang*, alt. 1,158 ft. Valley wider Glommen forms lake.
200½ m. *Stai*, alt. 863 ft. 209½ m. *Rasten*, alt 840 ft. 215½ m. *Ophus*, alt. 801 ft.

miles	
222	<i>Stenviken</i> , alt. 791 ft., after crossing the Glommen by bridge 144 yds. long. Line follows r. bank of Glommen.
230	<i>Rena</i> , alt. 738 ft.
234½	<i>Aasta</i> , alt. 741 ft. Leaving, line crosses the <i>Aasta</i> . 242 m. <i>Öksna</i> , alt. 666 ft. 246½ m. <i>Grundset</i> , alt. 643 ft.
250	Elverum , alt. 617 ft., the last station in the Glommen valley. Road bridge. The line now turns WSW. and crosses <i>Terningmoen</i> drill-ground. For line to <i>Kongsvinger</i> , see Route 89.
251	Crosses the <i>Terningaa</i> and ascends.
253½	Recrosses the <i>Terningaa</i> .
254	Crosses the <i>Terningaa</i> . Alt. 885 ft. 259 m. <i>Löiten</i> , alt. 758 ft. 260½ m. <i>Aadalsbruk</i> , alt. 643 ft. 262 m. <i>Hörsand</i> , alt. 571 ft. 263½ m. <i>Ilseng</i> , alt. 489 ft. 266½ m. <i>Hjellum</i> , alt. 433 ft.
267½	<i>Aaker</i> , alt. 420 ft., on <i>Aakersviken</i> , a gulf of <i>Mjösen</i> . Leaving, crosses <i>Aakerviken</i> on embankment and skirts the lake to
269	Hamar , alt. 416 ft. Here the narrow-gauge line ends and the standard-gauge begins. For line to <i>Otta</i> and <i>Dombaas</i> , see Route 90. Line leaves <i>Hamar</i> by embankment across <i>Aakersviken</i> , with 40-yd. bridge in middle. Line runs more or less S.
273½	<i>Ottestad</i> , alt. 610 ft. 276½ m. <i>Stange</i> , alt. 729 ft. 280½ m. <i>Stensrud</i> halt.
284½	<i>Tangen</i> , alt. 538 ft. Line runs near <i>Mjösen</i> .
286½	<i>Espen</i> , alt. 427 ft.
294½	<i>Ulven</i> (<i>Morskogen</i>), alt. 275 ft., on <i>Mjösen</i> .
300½	<i>Minne</i> , after crossing the <i>Vormen</i> on iron bridge 396 yds. long, line descends r. bank of <i>Vormen</i> .
305½	Eidsvold , alt. 413 ft. After short tunnel, line leaves

miles

Vormen and turns SSW. and ascends the Audelv valley, crossing the river seven times.

308½ Before a short tunnel, when line leaves river to S.

310½ Another short tunnel.

311½ m. *Dal*. 319½ m. *Jesseim*. 324½ m. *Klöstén*, alt. 545 ft.

328½ *Frogner*, alt. 405 ft., on Levelv, which line follows.

329½ m. Crosses the Levelv and follows r. bank.

331½ m. *Lersum*.

335 **Lilleström**, alt. 355 ft., on Nitelv near head of Öieren; branch lines to river.

For line to Kongsvinger and Stockholm, see Route 65.

Leaving Lilleström, line turns W. and crosses the Nitelv.

336½ *Strømmen*, alt. 485 ft.

341 *Grorud*, alt. 420 ft. Line curving much.

343½ **Alnabru**.

Branch W. to *Grefsen* 2 m., on Roa-Kristiania line, Route 92.

345½ *Bryn*, alt. 260 ft.

346½ Line from Bergen and Roa joins from N.; see Route 92.

348 **Kristiania**, Hoved-banegaard.

ROUTE 89

ELVERUM—KONGSVINGER, 57 miles

0 **Elverum**, alt. 617 ft. Line descends along r. bank of the Glommen.

3½ m. *Vesterhaug*. 5½ m. *Heradsbygden*. 8½ m. *Jömma*. 14½ m. *Braskerudfoss*. 18½ m. *Vaaler*. 24 m. *Haslemo*.

27 **Flisen**, alt. 508 ft.

30½ m. *Arneberg*, alt. 544 ft. 35 m. *Navnaan*, alt. 524 ft. 35½ m. Crosses the Navnaa. 37½ m.

miles

Kirkenær, alt. 502 ft. 39½ m. Passes W. end of *Gaardsjön*. 41 m. *Grinder*, alt. 521 ft. 45½ m. *Nor*, alt. 508 ft. Leaving, line crosses stream from *Nueren* to the *Glommen*. 52 m. *Roverud*, alt. 486 ft.

57½ **Kongsvinger**, alt. 480 ft.

For line from *Kristiania* to *Stockholm*, see Route 65.

ROUTE 90

HAMAR—DOMBAAS, 135 miles

- 0 **Hamar**, alt. 416 ft. Line skirts *Furnesfjord*.
 4¼ *Jesnes*, alt. 430 ft.
 8½ *Brumunddalen*, alt. 443 ft. Leaving, line crosses the *Brumunda*.
 11 *Veldre*, alt. 620 ft., near N. end of *Furnesfjord*.
 17 *Ringsaker*, alt. 613 ft.
 19½ *Moelven*, alt. 482 ft., after a tunnel and bridge over the **Moelv**.
 22 *Ring*, alt. 456 ft., on Lake *Mjösen*, which line skirts.
 27 *Bröttum*, alt. 437 ft.
 30¾ *Berseng*, alt. 437 ft. Tunnel before and two after.
 37 **Lillehammer**, alt. 588 ft. (190 ft. above *Mjösen*), pop. 4,800. Leaving, line crosses the *Mesna* by lattice girder bridge; skirts *Mjösen* and ascends *Laagen* or *Gudbrandsdal* by l. bank.
 41¼ m. *Faaberg*, alt. 485 ft. 45 m. *Hunder*, alt. 553 ft.
 48¾ *Öier*, alt. 597 ft., after crossing the *Laagen* by 5-span bridge. Road bridge over river.
 55½ *Tretten*, alt. 627 ft. Road bridge over river. Line following r. bank of *Laagen*, which widens here to *Lake Losna*.
 61¾ *Losna*, alt. 627 ft. High altitudes to W.
 66¾ *Myre*, alt. 617 ft. Road bridge over the *Laagen* at N. end of *Lake Losna*.

miles	
73	<i>Ringebu</i> , alt. 646 ft.. after crossing the <i>Laagen</i>
75½	Crosses the <i>Fryaa</i> . Sides of valley become steeper.
78½	<i>Hundorp</i> , alt. 633 ft.
83½	<i>Harpefoss</i> , alt. 731 ft. River below in narrow gorge. Road bridge.
87¼	<i>Vinstra</i> , alt. 791 ft. Road bridge over river.
93½	<i>Kvam</i> , alt. 873 ft. Valley sides very steep.
99¾	<i>Sjoa</i> , alt. 935 ft. Leaving, line crosses the <i>Laagen</i>
100¾	by long bridge.
106½	Otta , alt. 944 ft., after crossing the <i>Otta</i> by a 3-span bridge.
114	<i>Sel</i> , alt. 942 ft.
122	<i>Brennhaugen</i> , alt. 1,443 ft.
127	<i>Dovre</i> , alt. 1,594 ft.
135	Dombaas , alt. 2,110 ft. Line reported under construction to <i>Stören</i> on line from <i>Trondhjem</i> to <i>Hamar</i> and <i>Kristiania</i> . Line also under construction to <i>Aandalsnes</i> (Nes), seaport, about 65 miles.

ROUTE 91

SÖRUMSAND—SKULLERUD (gauge 1·067 metre), 36 miles

0	Sörumsand . Line runs near main line.
1¾	Line leaves main line to N. and turns SE. 4¼ m. <i>Kvevli</i> . 6¾ m. <i>Mork</i> .
7¾	Branch line N. to <i>Aremoén</i> , 1¾ miles. 10 m. <i>Killingmo</i> . 11¼ m. <i>Finstad</i> . 12½ m. <i>Urs</i> <i>kog</i> . 15 m. <i>Lierfoss</i> . Line turns S.
18	<i>Björkelangen</i> . Line descends valley.
20½	<i>Hornaaseng</i> . Line skirts <i>Birklangen</i> . 24¼ m. <i>Fosser</i> . 26 m. <i>Löken</i> . 28½ m. <i>Hjelleböl</i> . 31 m. <i>Hemnes</i> .
36	Skullerud , lake port. Steamers S. to <i>Fredrikshald</i> by long series of linked lakes, and <i>Fredrikshald Canal</i> , about 50 miles.

ROUTE 92

BERGEN—KRISTIANIA, 305 miles

miles

0	Bergen , large seaport. New station at N. end of Store Lungegaardsvand, which line skirts and traverses tunnel.														
1 $\frac{3}{4}$	Kronstad . Old line from Bergen joins, 1 $\frac{3}{4}$ miles long.														
2 $\frac{1}{4}$	<i>Minde</i> .														
3 $\frac{1}{2}$	<i>Fjösanger</i> , on Nordaasvand.														
4 $\frac{3}{4}$	<i>Hop</i> .														
6	Nesttun , alt. 104 ft. Line turns NE., crosses the Nesttunelv , and ascends Langedal .														
<table> <tr> <th>miles</th><th>Branch S. to Os :—</th></tr> <tr> <td>0</td><td><i>Nesttun</i>. 1$\frac{1}{4}$ m. <i>Skjold</i> halt. 3 m. <i>Raadal</i>. 4$\frac{1}{4}$ m. <i>Stend</i>.</td></tr> <tr> <td>5$\frac{1}{2}$</td><td><i>Fane</i>, near head of Fanefjord.</td></tr> <tr> <td>9$\frac{1}{4}$</td><td><i>Kalandseid</i>, after skirting Kalandsvand.</td></tr> <tr> <td>11</td><td><i>Søfteland</i>. Line passes between lakes to</td></tr> <tr> <td>14</td><td><i>Ulven</i>.</td></tr> <tr> <td>15$\frac{3}{4}$</td><td><i>Os</i>, small seaport on Bjørnefjord.</td></tr> </table>		miles	Branch S. to Os :—	0	<i>Nesttun</i> . 1 $\frac{1}{4}$ m. <i>Skjold</i> halt. 3 m. <i>Raadal</i> . 4 $\frac{1}{4}$ m. <i>Stend</i> .	5 $\frac{1}{2}$	<i>Fane</i> , near head of Fanefjord.	9 $\frac{1}{4}$	<i>Kalandseid</i> , after skirting Kalandsvand.	11	<i>Søfteland</i> . Line passes between lakes to	14	<i>Ulven</i> .	15 $\frac{3}{4}$	<i>Os</i> , small seaport on Bjørnefjord.
miles	Branch S. to Os :—														
0	<i>Nesttun</i> . 1 $\frac{1}{4}$ m. <i>Skjold</i> halt. 3 m. <i>Raadal</i> . 4 $\frac{1}{4}$ m. <i>Stend</i> .														
5 $\frac{1}{2}$	<i>Fane</i> , near head of Fanefjord.														
9 $\frac{1}{4}$	<i>Kalandseid</i> , after skirting Kalandsvand.														
11	<i>Søfteland</i> . Line passes between lakes to														
14	<i>Ulven</i> .														
15 $\frac{3}{4}$	<i>Os</i> , small seaport on Bjørnefjord.														
7 $\frac{3}{4}$	Heldal . Line skirts Grimenvand and traverses two tunnels.														
10 $\frac{3}{4}$	Haukeland , alt. 269 ft., on Haukelandsvand, which line skirts to N.														
12 $\frac{1}{2}$	<i>Espeland</i> .														
15 $\frac{1}{2}$	Arne , alt. 65 ft., at head of Arnevaag.														
17 $\frac{1}{4}$	Garnes , alt. 65 ft., on Sörfjord, after line turns SE.														
24	Trengereid , alt. 50 ft., after skirting Sörfjord and traversing several tunnels.														
32	Vaxdal , alt. 50 ft., after crossing Vaxdalelv. Line continues N. along Sörfjord : several tunnels.														
37	Stanghelle . Leaving, line crosses the Dalsvaag and ascends the r. bank.														
41 $\frac{1}{4}$	Dale , after crossing the Bergensdalelv. Line skirts Bolstadfjord to ENE. and traverses nine tunnels, of which longest is 1,414 yds. long.														

miles

- 48 *Bolstad*, alt. 29 ft., at head of fjord. Line turns E. in general and ascends on l. bank of Vosseelv and skirts Evangervand. Eight tunnels.
- 54½ *Evanger*, alt. 50 ft. Line continues on l. bank of Vosseelv.
- 61 *Bulken*, alt. 148 ft., on Vangsvand after crossing the Vosseelv by short tunnel. Line skirts Vangsvand. One short tunnel.
- 66 *Voss*, alt. 187 ft.; small agricultural town. Leaving, line crosses the effluent of the Lundervand by stone bridge and ascends. Several tunnels.
- 70 *Ygre*, alt. 551 ft. Sverreskar ravine below on r. Line ascends Rundal: numerous tunnels.
- 75 *Grove*, alt. 997 ft.
- 80½ *Reime*, alt. 1,526 ft. Tunnels.
- 85½ *Mjölfjell*, alt. 2,057 ft. Leaving, line crosses the Rjoandaa, which is led in tunnel under line.
- 93 *Opset*, alt. 2,789 ft. Leaving, line enters Gravehals tunnel, 3½ miles long. Line above the limit of trees.
- 97½ *Myrdal*, alt. 2,845 ft., in Flaamsdal. River 1,000 ft. below.
- Branch N. down Flaamsdal to *Fretheim* on Aurlandsfjord, 11 miles—rack electric railway.
- 98½ Line enters tunnel one mile long and turns SE.
- 101 Crosses outlet of Klerevand by high bridge.
- 105½ *Hallingskeid*, alt. 3,641 ft., in Moldadal. River and small lakes far below.
- 112 Alt. 4,270 ft., on Taugevand: culminating point of line. The snowfields of Hardanger Jökul, 6,536 ft., to S.
- 119 *Finse*, alt. 4,010 ft., on Finsevand in Finsedal.
- 135 *Haugastøl*, alt. 3,240 ft., on Sletfjord, an arm of Ustavand. To the N. is snow-covered Hallingskarv, 6,955 ft.
- 142 *Ustaoset*, alt. 3,230 ft., on Ustavand. Line descends Ustadal to ENE.

miles

- 150 $\frac{1}{4}$ *Gjeilo*, alt. 2,604 ft. Hallingskarv to W. Snow sheds cease, trees begin.
- 156 $\frac{1}{2}$ *Hol*, alt. 1,980 ft. Line skirts Strandefjord.
- 164 *Aal*, alt. 1,434 ft. Line descending Hallingdal.
- 170 *Torpe*, alt. 1,073 ft.
- 180 *Gol*, alt. 679 ft. Line turns SE.
- 190 $\frac{1}{2}$ *Nesbyen*, alt. 554 ft. Naes village across the river, which from here onwards is wide.
- 194 $\frac{3}{4}$ *Liodden*.
- 197 $\frac{3}{4}$ *Bromma*.
- 199 $\frac{1}{2}$ *Bergheim*, after a tunnel.
- 205 $\frac{3}{4}$ *Austvoll*, after a tunnel.
- 210 $\frac{1}{2}$ *Flaa*, alt. 508 ft., several tunnels.
- 218 *Gulsvik*, alt. 509 ft., at N. end of Krödrenfjord, which line skirts to
- 225 $\frac{1}{2}$ *Örgenviken*. Leaving station, line turns E. and enters Haversting tunnel, 1 $\frac{1}{4}$ m.; descends Rudelv to SE.
- 235 $\frac{1}{2}$ *Sokna*. Line descends Sognedal.
- 243 *Veme*, after several tunnels.
- 250 $\frac{1}{2}$ **Hönefos**, alt. 315 ft.
For narrow-gauge line from Drammen to Randsfjord see Route 95.
Leaving station, line crosses the Baegna and ascends to NE.
- 252 $\frac{1}{4}$ Crosses the Randselv and ascends valley.
- 253 *Hval*.
- 258 $\frac{1}{2}$ *Jevnaker*, alt. 459 ft., on Randsfjord, which line skirts, and then ascends.
- 264 $\frac{3}{4}$ *Grindvol*, alt. 1,020 ft. Line ascends to 1,214 ft. and then descends to
- 269 $\frac{1}{4}$ **Roa**, alt. 1,023 ft. Line turns SE. For line to Gjövik and Fagernes see Route 93.
- 272 $\frac{1}{2}$ *Grua*, alt. 1,214 ft., after three short tunnels. Line descends Hakedal.
- 275 *Björgesaeter*, alt. 1,056 ft.
- 278 *Harestuen*, alt. 858 ft.

miles

- 281½ Crosses the Nitelv and follows r. side of valley.
 285¼ *Hakedal*, alt. 545 ft. Line gradually leaves valley
 and ascends
 288¼ *Aaneby*.
 290 *Nittedal*, alt. 770 ft. Line turns W. and then S.
 Several tunnels.
 295 *Sandermosen*.
 298¾ *Kjelsaas*, alt. 509 ft., after skirting Maridalsvand.
 300½ **Grefsen**, alt. 355 ft.
- Branch E. to *Alnabru*, 12 miles, on Kristiania-Laxå line, see
 Route 45.
- 302¼ *Töien*.
 303¼ Line to Laxå and Stockholm leaves to E., see
 Route 45.
 304¾ **Kristiania**, alt. 9 ft. Hoved-banegaard.

ROUTE 93

ROA—GJÖVIK, 40½ miles

- 0 **Roa**, alt. 1,023 ft. Line goes N.
 1¾ *Lunner*, alt. 918 ft. Line descends the Vigga valley.
 6 *Gran*, alt. 672 ft., at S. end of Jarenvand.
 8½ **Jaren**, alt. 680 ft., near N. end of Jarenvand.

Branch NW. to Röikenvik :—2½ m. *Brandbu*, alt. 584 ft. 4¼ m.
Röikenvik, alt. 452 ft., lake port on Randsfjörd.

- 14 *Bleiken* halt, alt. 1,165 ft. Line ascends steeply.
 20½ *Kutjern* halt, alt. 1,628 ft. Summit of line.
 24 *Haagaar*, alt. 1,404 ft. Line skirts Einavand to
 26½ **Eina**, alt. 1,315 ft.

miles

- Branch W. to Fagernes (Valdres railway) :—
 0 *Eina*. Line ascends and skirts Skjelbreiavand.
 5 *Trevand*, alt. 1,273 ft., at S. end of Trevand.
 9¼ *Skrukli*, alt. 1,293 ft., after sharp curve. Leaving,
 line skirts precipice and then crosses the Faldselv by
 bridge 40 ft. long.

miles

miles

12 $\frac{1}{4}$	<i>Fald</i> , alt. 980 ft. Line skirts Randsfjord.
14	<i>Hov</i> , alt. 764 ft. 14 $\frac{1}{2}$ m. Crosses the Lösolv.
19 $\frac{1}{4}$	<i>Fluberg</i> , alt. 508 ft. 22 $\frac{1}{4}$ m. Crosses the Sedalselv.
23 $\frac{1}{4}$	<i>Odnes</i> , alt. 453 ft. Line leaves Randsfjord and ascends the valley of the Etna.
28 $\frac{3}{4}$	<i>Dokka</i> , alt. 486 ft. Leaving, line crosses the Dokka by a two-span iron bridge, each span 32 yds. long.
33	<i>Nordsinnen</i> halt, alt. 876 ft. Line ascending r. side of Etna valley.
39 $\frac{3}{4}$	<i>Etna</i> halt, alt. 1,575 ft. Line leaves Etna valley.
47 $\frac{3}{4}$	<i>Tonsaasen</i> , alt. 2,241 ft., after a tunnel. Summit of line.
55 $\frac{3}{4}$	<i>Björge</i> , alt. 1,673 ft. Line ascending l. of Baegna valley.
58 $\frac{3}{4}$	<i>Aurdal</i> , alt. 1,499 ft.
65	<i>Leira</i> , alt. 1,220 ft.
67 $\frac{1}{2}$	<i>Fagernes</i> , alt. 1,188 ft., on Strandefjord.

30 $\frac{1}{4}$

Reinsvold, alt. 1,167 ft. Line descending valley of Hannselv.

miles

Branch SE. to Skreia :—

0	<i>Reinsvold</i> .
2 $\frac{1}{2}$	<i>Böverbru</i> , alt. 1,183 ft.
5 $\frac{1}{2}$	<i>Kolbu</i> , alt. 942 ft.
8 $\frac{1}{2}$	<i>Lena</i> , alt. 751 ft.
9 $\frac{3}{4}$	<i>Kraby</i> , alt. 715 ft.
10 $\frac{1}{2}$	<i>Bilidt</i> , alt. 718 ft., after a tunnel.
12 $\frac{1}{4}$	<i>Skreia</i> , alt. 530 ft., on the Lena near Lake Mjösen.

33 $\frac{1}{4}$

Raufoss, alt. 1,060 ft. Cartridge factory.

35

Breiskallen, alt. 922 ft.

37 $\frac{1}{2}$

Nygaard, alt. 705 ft. Line turns E. and with a wide curve reaches

40 $\frac{1}{2}$

Gjövik, alt. 422 ft. Lake port on Mjösen.

ROUTE 94

KRISTIANIA—DRAMMEN—SKIEN (gauge 1·067 metre), 123 miles

miles

- 0 **Kristiania**, west station, connected with Hovedbane station by line E. round Akershus peninsula and fortress. Line skirts fjord.
- 1½ *Skarpsno*.
- 2 *Sköien* (Bygdo), after crossing the Frognerelv. Leaving, line crosses the Horselv.
- 2¾ *Bestum*.
- 3½ *Lysaker*, after crossing the Lysakerselv. Line turns SW.
5 m. *Stabaek*. 6 m. *Hövik*.
- 7¾ *Sandviken*, after skirting Engervand. Leaving, line crosses the Sandvikenselv.
- 9 *Slependen*. Line ascending. Two tunnels before
- 11¾ *Hvalstad*, alt. 219 ft. Leaving, line crosses timber viaduct 92 ft. high.
- 14 *Asker*, alt. 340 ft. Line turns S., and skirts Bondivand and Gjellumvand and descends.
- 17½ *Heggedal*, alt. 315 ft. Line descends valley. High hills to E. and W.
20½ m. *Röken*. Line turns W. 22¼ m. *Spikkestad*.
- 23¼ Tunnel, after which line ascends valley of the Lierelv to NNW.
- 27½ **Lier**, after crossing the Lierelv. Line turns S.
Branch N. to *Sjaastad*, 6 miles, and to *Svangstrand*, 13 miles, lake port on Holsfjord.
- 30½ *Brageröen*, on Drammensfjord, suburb of Drammen. Crosses the Drammenselv via Möllerholm Island and two long bridges to
- 32 **Drammen**, large timber port at mouth of the Drammenselv. Line to wharves. For line to Hougesund and Hønefos with branches, see Route 95.
Line turns SE. and then S. and ascends rapidly.

miles

- 37½ m. *Gundesö* halt, alt. 262 ft. 38½ m. *Skoger*, alt. 249 ft.
- 41½ Crosses the Sandeelv by one-span bridge 56 ft. long. 42 m. *Galleberg*, alt. 115 ft. 44½ m. *Sande*, alt. 52 ft.
- 47 *Holm* halt, alt. 79 ft. Line approaches Sandesognsfjord.
- 52½ **Holmestrand**, alt. 16 ft., after skirting fjord. For line to Vittingfos and Eidsfos, see Routes 96 and 97.
- 58 *Nykirke*, alt. 259 ft. Line turning S. away from fjord.
- 61 **Skoppum**, alt. 131 ft.
- Branch E. to Horten:—2½ m. *Borre*, alt. 85 ft. Line turns N. 4½ m. *Horten*, alt. 9 ft.: government dockyard on Kristianiafjord.
- 62¾ *Adal*, alt. 187 ft.
- 66½ *Barkaaker*, alt. 154 ft.
- 69 Junction (*Jarlsborg*).
- Branch SE. to *Tönsberg*, seaport, 1½ miles: train backs. New line under construction to put *Tönsberg* on loop of main line.
- 69¼ Line NW. Eidsfos line branches, see Route 97.
- 72¾ *Sem*, alt. 46 ft. Line turns SSW.
- 77 *Stokke*, alt. 192 ft., after passing end of *Akersvand*.
- 81¼ *Raastad*, alt. 128 ft.
- 83¾ *Sandefjord*, alt. 49 ft., seaport.
- 86¾ *Jaaberg*, alt. 78 ft.
- 89¾ *Tjølling*, alt. 85 ft.
- 91½ *Viksfjord* (*Östby*), alt. 62 ft.
- 93¼ *Grötting*, alt. 23 ft.
- Crosses the Laag by iron bridge 179 yds. long with five spans, each of 36 yds., 29 ft. above water level. Two tunnels.
- 95 **Larvik**, alt. 6 ft.; seaport; station on quay. Leaving, line crosses isthmus at head of *Larviksfjord* and turns NW., skirting *Farrisvand* and *Nesfjord* and passing through 7 tunnels.

miles

- 101 $\frac{3}{4}$ *Kjose*, alt. 105 ft.
 104 $\frac{3}{4}$ *Ekenes* halt, alt. 105 ft., on *Farrisvand*. Four tunnels before
 109 $\frac{3}{4}$ *Aaklungen*, alt. 148 ft., on lake of same name. Line soon turns SW. and descends *Björkedal*.
 113 $\frac{1}{2}$ *Björkedalen*, alt. 236 ft.
 116 *Eidanger*, alt. 131 ft. Line turns NW.

miles

Branch S. to *Brevik* (gauge 1·067 metre):—

- 0 *Eidanger*.
 1 $\frac{1}{4}$ *Nystrand* halt, alt. 125 ft.
 2 $\frac{1}{4}$ *Skjelsvik* halt, alt. 98 ft.
 4 $\frac{1}{4}$ *Heistad* halt, alt. 39 ft.
 6 *Brevik*, alt. 39 ft. : seaport.

- 117 $\frac{3}{4}$ *Porsgrund*, alt. 20 ft. ; seaport. Line ascends l. bank of the *Skienselv*.
 120 $\frac{3}{4}$ *Böle* halt, alt. 43 ft. Short tunnel before
 123 $\frac{1}{4}$ *Skien*, alt. 10 ft. ; seaport on the *Skienselv*. Line under construction to *Notodden* and *Kongsberg*. Route to the north is by steamer along *Nordsjön*, the *Sauervelv* and *Hitterdalsvand* to
 157 *Notodden*, alt. 50 ft. Railway along the *Tinelv*.
 160 $\frac{3}{4}$ *Lilleherred*.
 162 Crosses the *Tinelv*.
 165 $\frac{3}{4}$ *Grønvoldfoss*.
 168 *Aarlifoss*.
 169 $\frac{3}{4}$ Crosses the *Tinelv*.
 172 $\frac{3}{4}$ *Gransherred*.
 175 $\frac{1}{4}$ *Tinnoset*, alt. 605 ft., where *Tinelv* leaves *Tinsjön*. Railway ends. Lake steamer runs along *Tinsjö* and carries railway trucks to
 193 *Rollag*, on *Vestfjord* near head of lake. Railway SW. to
 196 *Miland*.
 200 $\frac{1}{4}$ *Överland*.
 202 $\frac{3}{4}$ *Rjukan* (*Saaheim*), alt. 997 ft. ; saltpetre works.

ROUTE 95

DRAMMEN—HOUGSUND—RANDSFJORD (standard gauge),
54 miles

miles

- 0 **Drammen.** Line ascends r. bank of the Dramselv.
1 $\frac{3}{4}$ m. *Gulskogen*, alt. 26 ft. 2 $\frac{1}{4}$ m. *Pukerud*.
6 $\frac{1}{2}$ m. *Mjøndalen*.
- 10 $\frac{1}{4}$ **Hougsund**, after crossing stream. Line turns N.
Branch SW. to Kongsberg:—3 m. *Vestfossen*. 6 $\frac{1}{2}$ m. *Darbu* (Flesaker), alt. 59 ft., on Ekersjön. 9 $\frac{1}{4}$ m. *Krekling*, alt. 412 ft. 13 $\frac{1}{2}$ m. *Skollenborg*, alt. 540 ft. Line turns NW. 17 $\frac{1}{4}$ m. *Kongsberg*, alt. 488 ft., on the Laagen: silver mines. Line under construction to Skien.
- 13 $\frac{1}{4}$ **Burud.** Line ascends the Dramselv by r. bank.
16 $\frac{1}{4}$ m. *Skotselven*. 20 m. *Aamot*, after crossing the Dramselv.
- 23 $\frac{3}{4}$ *Gjeithus*, after recrossing the Dramselv.
- 26 $\frac{1}{4}$ **Vikesund**, on Tyrifjord, which line skirts to NE.
Branch NW. to Kröderen:—0 m. *Vikesund*. Line ascends valley of Snarumselv. 7 $\frac{1}{2}$ m. *Snarum*, alt. 548 ft. 16 m. *Kröderen* on Kröderensjön.
- 35 $\frac{1}{2}$ *Skjaerdalen*, on Tyrifjord.
- 39 $\frac{3}{4}$ *Ask*. Leaving station, line crosses the Soknaelv.
- 43 $\frac{1}{2}$ **Hönefos**, alt. 315 ft., on the Baegna. For line from Bergen to Kristiania, see Route 92. Line turns N. along r. bank of Baegna.
- 47 Crosses the Baegna and follows l. bank.
- 47 $\frac{3}{4}$ *Hen*, river port. Leaving, line leaves river and turns more E.
- 54 $\frac{1}{2}$ **Randsfjord**, alt. 446 ft., on r. bank of Randselv at its exit from Randsfjord.

ROUTE 96

HOLMESTRAND—VITTINGFOS (gauge 1·067 metre), 19 miles

miles

- 0 **Holmestrand**, alt. 3 ft. Line turns S. and ascends steeply with locomotive pushing for $\frac{3}{4}$ mile, where locomotive changes end on a level stretch and turns NE., and traverses tunnel 374 yds. long.
3 m. *Ramberg*, alt. 364 ft. $4\frac{1}{4}$ m. *Guldhaug*, alt. 440 ft. 6 m. *Hynnaas*, alt. 315 ft.
- $7\frac{3}{4}$ **Hillestad**, alt. 148 ft., on Hillestadvand, which line skirts. For line from Tönsberg, see Route 97.
- $10\frac{1}{4}$ *Sundbyfoss*, alt. 195 ft.
- $11\frac{1}{2}$ **Hoff**, alt. 223 ft. Line turns SW. For line to Eidsfos, see Route 97
 $13\frac{1}{4}$ m. *Haslestad*, alt. 232 ft. $14\frac{3}{4}$ m. *Kleppan*, alt. 400 ft.
- 19 **Vittingfos**, alt. 223 ft. on the Laag.

ROUTE 97

TÖNSBERG—EIDSFOS (gauge 1·067 metre), 29 miles

- 0 **Tönsberg**, alt. 46 ft. Line to harbour. Joint station for this and Drammen line being built.
- $1\frac{1}{2}$ Line from Drammen joins for 1 mile, see Route 94.
- $3\frac{3}{4}$ **Ouli**, alt. 26 ft. Line ascends valley of the Auli to NW.
- $6\frac{1}{4}$ *Frete*, alt. 26 ft. Leaving, line crosses the Auli but continues up valley.
- $7\frac{1}{2}$ *Klop*, alt. 59 ft.
- $9\frac{1}{4}$ *Ramnes*, alt. 82 ft. Leaving, line recrosses the Auli and leaves valley.
 $10\frac{1}{2}$ m. *Raevetal*, alt. 92 ft. $11\frac{3}{4}$ m. *Fossan*, alt. 105 ft. $13\frac{1}{4}$ m. *Svinevold*, alt. 131 ft. 15 m. *Bagstvold*, alt. 131 ft. $17\frac{1}{2}$ m. *Barkost*, alt. 148 ft.

N. AND S.

D d

miles

- 20 **Hillestad**, alt. 148 ft., on Hillestadvand which line skirts. For line from Holmestrand, see Route 96.
- 22½ *Sundbyfoss*, alt. 195 ft.
- 23¾ **Hoff**, alt. 223 ft. For line to Vittingfoss, see Route 96.
- 25½ *Kopstad* (Usby), alt. 128 ft.
- 27¼ **Braeckke**, alt. 125 ft., on Bergsvand which line skirts.
- 29 **Eidsfos**, alt. 124 ft., between Bergsvand and Ekeren.

ROUTE 98

ARENDAL—TVEITSUND (narrow gauge), 56½ miles

- 0 **Arendal**, seaport. Line turns W. and winds among lakes.
3 m. *Braastad*. 4¾ m. *Rossedalen*.
- 6 **Rise**, on the Nid. Line turns N.
Branch S. to Grimstad (gauge 1·067 metres):—0 m. *Rise*. Line descends valley of the Nid. 1½ m. *Löddesöl*. 4¼ m. *Rygene*. Leaving, line crosses the Nid. 6 m. *Lien*. 7¾ m. *Spedalen*. 11½ m. *Gjaerbrönden*. 13¼ m. *Grimstad*, seaport.
- 8½ *Blakstad*. Road bridge over the Nid.
- 11 *Froland*, after crossing the Nid.
14¾ m. *Böilestad*. 16½ m. *Böilefossbro*, after re-crossing the Nid.
- 19½ *Flaten*.
- 22½ *Nelaug*. Line skirts Nelaugvand and crosses lake by bridge and natural causeway.
- 25¾ *Simonstad*, on the Nid.
- 32½ *Vallekilen*, on Vallevand which line skirts.
- 35¼ *Aamli*, on the Nid which line continues to follow to N.
39 m. *Seljaas*. 40½ m. *Sandaa*. 45¼ m. *Oi*.
48¼ m. *Gankaas*. 52¾ m. *Kjönnefoss*.
- 56½ **Tveitsund**, at S. end of Nisservand.

ROUTE 99

LILLESAND—FLAKKSVAND (gauge 1·067 metre), 10 miles

miles

0	Lillesand , seaport ; station near wharf. 1½ m. <i>Möglestu</i> halt, alt. 136 ft. 3 m. <i>Storemyr</i> , alt. 154 ft. 4¼ m. <i>Eigeland</i> halt, alt. 164 ft. 6¾ m. <i>Treide</i> , alt. 233 ft.
8½	<i>Birkeland</i> , alt. 151 ft.
10½	Flakksvand , alt. 88 ft., on the Topdalselv.

ROUTE 100

KRISTIANSAND—BYGLANDSFJORD (gauge 1·067 metre), 48 miles

0	Kristiansand , alt. 16 ft. ; seaport. Line crosses the Grimsbaken and ascends.
4½	<i>Krernvolden</i> halt, alt. 69 ft. Line ascends valley of the Otteraa.
6	<i>Mosby</i> , alt. 23 ft. Five short tunnels before next station.
7	Crosses the Otteraa by lattice bridge 210 yds. long with 6 spans.
9	Vennesla , alt. 141 ft. Branch across river to Hundfors paper mill and aluminium works, 1 mile.
12	<i>Grovene</i> halt, alt. 141 ft., after crossing stream.
13½	Recrosses the Otteraa by one-span bridge 55 yds. long and ascends r. bank.
17	<i>Röiknes</i> halt, alt. 334 ft. Leaving, line crosses the Lanaa. 21½ m. <i>Iveland</i> halt, alt. 410 ft. 26¾ m. <i>Haegeland</i> , alt. 558 ft.

miles

- 31½ m. *Hornesund*, alt. 561 ft. 34½ m. *Moisund*, alt. 574 ft.
- 38½ *Hornes*, alt. 577 ft., after crossing Voiberne Lake on long wooden viaduct. Leaving, line crosses the Otteråa by iron bridge.
- 41 *Evje*, alt. 590 ft.
- 47¾ *Byglandsfjord*, alt. 676 ft., at S. end of Byglandsfjord.

ROUTE 101

STAVANGER—FLEKKEFJORD (gauge 1·067 metre), 92½ miles

- 0 **Stavanger**, large seaport. Line runs S. skirting Gandefjord.
- 3¾ *Hinna*.
- 9½ **Sandnes**, at S. end of fjord. Line ascends valley. 11 m. *Höiland*, alt. 69 ft. 12¾ m. Crosses stream.
- 15½ *Klepp*, alt. 85 ft., on Fröilandsvand which line skirts.
- 18½ *Time*, at S. end of Fröilandsvand. 20 m. *Hognestad*. 20¾ m. Crosses the Fosselv. 23 m. *Naerbö*. 26 m. *Varhaug*.
- 29¾ *Vigrestad*, alt. 131 ft., 1 mile from coast.
- 32¾ *Bru* on Bruvand, ½ mile from coast.
- 35½ *Ogne*. Leaving, line crosses the Ogneelv.
- 36½ *Store Sirevaag*, on coast.
- 38½ *Vatnemo*, on isthmus between two lakes near coast.
- 40¾ *Helvik*, after crossing Helviksvand.
- 42 *Lille Sirevaag*. Line skirts channel behind Egerö and crosses narrow channels.
- 45½ Line to **Egersund** (seaport), down which train backs, ¾ mile. Line soon turns N. and ascends by r. bank of the Helleland. Several tunnels between Egersund and Flekkefjord.
- 47¾ m. *Slettebø* halt, alt. 59 ft. 50¾ m. Line turns E.

miles	
52½	<i>Klungland</i> halt, alt. 280 ft. Leaving, line crosses the Helleland by 30 m. bridge of two spans.
55½	<i>Helleland</i> , alt. 292 ft. Line follows l. bank of the Helleland.
56½	Line leaves river after tunnel and turns E. past several lakes.
	63½ m. <i>Ueland</i> . 67¾ m. <i>Heskestad</i> halt, alt. 617 ft.
76½	<i>Moi</i> , alt. 188 ft., after skirting Hofrevand. Line skirts Lundevand and turns S.
83	<i>Sirnes</i> , alt. 175 ft.
87	<i>Flikkeid</i> halt, alt. 288 ft. Long tunnel on leaving.
90¾	<i>Loge</i> halt, alt. 13 ft., on Grisefjord.
92½	<i>Flekkefjord</i> , alt. 7 ft. ; small seaport.

APPENDIX III

WEIGHTS AND MEASURES, TIME, AND MAGNETIC VARIATIONS

WEIGHTS AND MEASURES

THE metric system is obligatory in both Norway and Sweden. Occasionally the older measures of distance are still used.

1 Norwegian mile = 7 statute miles = 6.097 nautical miles

1 Swedish mile = 6.6 statute miles = 5.769 nautical miles

In soundings, on Norwegian the *favn* (6.176 ft. or 1.029 fathom) and on Swedish charts the *famn* (5.84 ft. or 0.974 fathom) are used.

TIME

In both Norway and Sweden the standard time used is that of the meridian of 15° E. of Greenwich which is one hour fast on Greenwich mean time. This is Central Europe time.

MAGNETIC VARIATIONS

The magnetic variation in 1917 was about 10° W. on the meridian of Trondhjem and Horten (Kristianiafjord). Eastward it decreased to 5° W. at Stockholm and 1° W. at Haparanda, and westward it increased to 12° W. at the Naze, about 13½° W. at Bergen, and 14° W. on the extreme west of Norway. The curve of no variation cuts the north coast of Norway a few miles west of the North Cape : that of 4° E. at Vardö. In 1917 the magnetic variation was decreasing about 9' annually.

APPENDIX IV

PLACE-NAMES

THERE is no uniformity in the spelling of Scandinavian place-names. Several systems are in use on different maps. In this volume the spellings used are, as far as possible, those employed in the latest official maps, but even they show some divergence. Places with railway stations are spelt generally according to the official time tables.

The terminal definite (*-en*, *-et*) article has been retained in most names of lakes but deleted in names of rivers, fjords, and mountains. In the case of some valleys it has been retained. No uniformity is claimed, as there is none in common usage.

It should be noted that *v* and *f* are interchangeable, but that *f* is now seldom used in Norwegian. Initial *Hv* is often written *V*, and *Hj* as *J*; *ä* is often written *e*. The letter *d* combined with other consonants, or at the end of words, is often omitted. The letters *g* and *k* are interchangeable. In Norwegian the letters *aa* or *å*, *au*, and *ou* are often interchanged, and the same applies to *ä*, *u*, *ei*, and *e*. In Norwegian *w* does not occur: in Swedish *v* and *w* are equivalent. The letters *å*, *ä*, and *ö* come at the end of Scandinavian alphabets. The Norwegian *ø* is commonly written *ö*.

The following words commonly occur in place-names:

<i>å</i> (Swed.), river	<i>byggd</i> (Nor.), parish, village
<i>aa</i> (Nor.), river	<i>dal</i> (Nor.), valley
<i>älf</i> (Swed.), river	<i>eide</i> (Nor.), isthmus
<i>bakke</i> (Nor.), hill	<i>elv</i> (Nor.), river
<i>brae</i> (Nor.), glacier	<i>fjeld</i> (Nor.), mountain
<i>bu</i> , <i>bö</i> (Nor.), farm-house	<i>fjord</i> (Nor.), arm of sea
<i>by</i> (Nor.), town, village	<i>fos</i> (Nor.), waterfall

fors (Swed.), waterfall
haf (Swed.), sea
hav (Nor.), sea
hamn (Swed.), harbour
havn (Nor.), harbour
holm (Nor.), island
jaur (Lap.), lake
jökel (Swed.), glacier
jökul (Nor.), glacier
kulle (Swed.), hill
laag (Nor.), river

mork (Nor.), forest
nes (Nor.), cape
ö (Nor.), island
os (Nor.), mouth
sjö (Nor.), lake
sund (Nor.), strait
tind (Nor.), peak
träsk (Lap.), lake
vaag (Nor.), bay
vand, vatn (Nor.), water
varre (Lap.), hill

APPENDIX V

BOOKS AND MAPS

BOOKS

THE Governments of both Norway and Sweden have statistical departments which publish a number of annual volumes on all aspects of national activity. The detailed statistics are generally two or three years behind the date of publication. A summary appears annually in the *Statistisk Aarbok for Norge* and the *Statistisk Årsbok for Sverige*.

An official publication called *Norges Land og Folk* describes the country by 'amter'. The descriptions comprise full details of roads and railways and are accompanied by maps. Twenty volumes of dates ranging from 1885–1914 have appeared, but the work is incomplete and publication seems to have been suspended.

The Swedish Government published in 1914 *Sweden : Historical and Statistical Handbook*, by J. Guinchard. The book, which is in two large volumes, has also Swedish and German editions. It gives a very full account of geographical, historical, and economic aspects of the country. The Norwegian Government published in 1900 a similar but less exhaustive work (*Norway : Official Publication for the Paris Exhibition*), but it is now out of date.

A useful and trustworthy book is *Norges Geografi*, by Hans Reusch (Kristiania, 1915–17). There is a *Baedeker's Guide for Norway, Sweden, and Denmark*, 10th edition, 1912. Among books on history are *Scandinavia*, by R. Nisbet Bain, 1905 ; *Norway and the Union with Sweden*, by F. Nansen, 1905 ; and *Sweden for Peace*, by Eden.

MAPS

Norway

The official survey of Norway is in the hands of the *Norges geografiske Opmaalning*. It publishes a map of Norway on a scale of 1 : 100,000, in about 330 sheets of which only about 200 have yet appeared. Few sheets have been recently revised. The *Generalkart over det sydlige Norge*, in 18 sheets, on a scale of 1 : 400,000 extends as far north as lat. 66° N. Some of the sheets are fifty years old : others have been revised within the last ten years. There are also maps for each *amt* on various scales, generally 1 : 200,000 or 1 : 500,000. Many of these are old but they are the only maps which cover most of the northern parts of the country.

Aschehoug's Lommeatlas over Norge, 1911, is a useful unofficial pocket-atlas with maps on a scale of 1 : 1,000,000 except Finmark which is 1 : 2,000,000. Hahn's map is another unofficial publication—see Sweden, below.

The sheets of the map of Europe on the scale of 1 : 1,000,000 (provisional issue), published by the Geographical Section of the General Staff, cover Norway and Sweden.

Sweden

The survey of Sweden since 1894 has been in charge of the *Generalstabens Litografiska Anstalt* (topographical section of the General Staff). The country south of lat. 61° 30' N. is mapped on a scale of 1 : 100,000. There are 106 sheets, all of which are published with the exception of 5 or 6 in the western part of Kopparbergs län against the Norwegian frontier. Some of the sheets, however, are old and have not been revised for many years. The rest of the country is mapped on a scale of 1 : 200,000. The map comprises 84 sheets, of which about 10 in the south (in Norrlands län, Jämtlands län, and Kopparbergs län) are still unpublished. Some of these missing sheets are covered by an extension of the 1 : 100,000 map which has recently been carried north from

lat. $61^{\circ} 30'$ N. along the coast region as far as about lat. $64^{\circ} 30'$ N. The latest official map of Sweden is on a scale of 1 : 500,000 and covers the whole country in 32 sheets. It includes an index of names. These sheets date from 1912 to 1917. They are contoured and layer-coloured. Areas of Norway included in some of the sheets are filled in but not contoured or coloured. Economic maps on various scales from 1 : 20,000 to 1 : 100,000 exist for certain small areas. It is proposed to complete an economic map on a scale of 1 : 20,000 for the whole of Sweden with the exception of Lapland.

Unofficial maps include *Generalkarta öfver Sverige, Norge, och Danmark*, by August Hahn, scale 1 : 1,000,000, 4 sheets, July 1915, and *Cohrs' Atlas öfver Sverige*, 1913, a pocket-atlas with maps on a scale of 1 : 1,000,000 for the south, and 1 : 2,000,000 for the north of the country. For the maps of the Geographical Section of the General Staff, see Norway.

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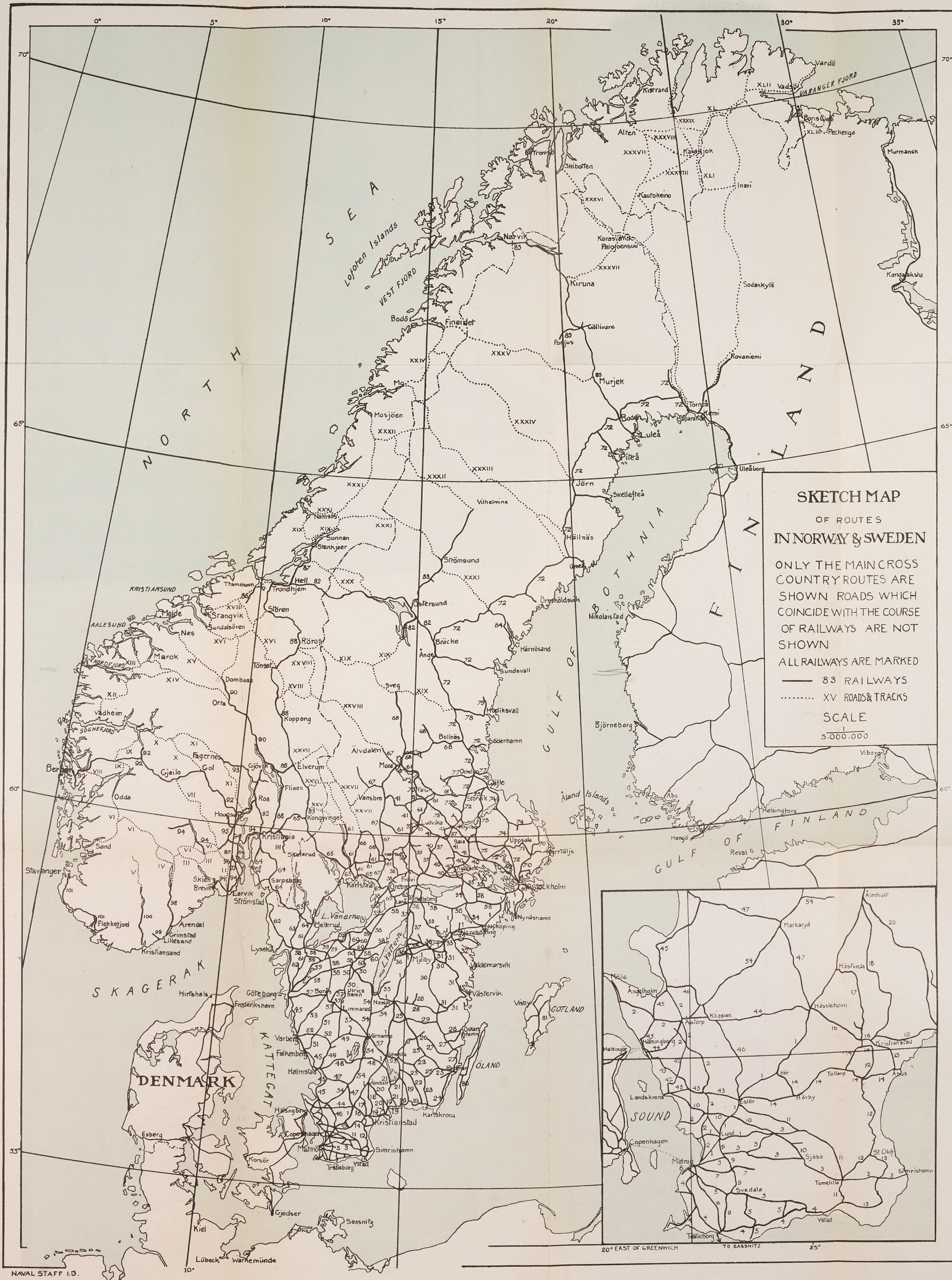
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